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THE RELATIONSHIP BETWEEN RAMUS HEIGHT, DENTAL HEIGHT, AND OVERBITE

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IN TWO articles of recent date, Diamond[1, 2] has put forth the view that dental height, which he describes as "those parts of the jawbones within which teeth are developing, plus the teeth in their later varying states of clinical eruption," is established primarily through growth in the vertical height of the ramus, and that excessive anterior overbite may be attributed to undue retardation in growth-length of the ramus with consequent failure of the intermaxillary space to develop. The theory is provocative; it seems quite plausible that the ramus should, by increasing in its length, carry the body of the mandible farther away from the upper jaw with the result that increased space for teeth is created. The argument is not consistent with the demonstration by Brodie[3] of the constancy of the human craniofacial pattern in growth, nor does it take sufficiently into account another possible explanation for the limitation of denture space which may be drawn from the work of Brodie and Thompson,[4] but it is eminently deserving of further investigation.

This study is undertaken to establish what correlation, if any, exists between the vertical dimensions of the mandibular ramus, the size of the denture space, and the degree of overbite.

If undue retardation of growth-length of the ramus is responsible for limitation of intermaxillary space and responsible for a deep overbite, individuals showing these latter deficiencies should, by and large, show deficient ramus height when compared with individuals with adequate denture space and a normal

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overbite. Needless to say, should such differences be demonstrated it would be necessary to establish that they are statistically significant and not due merely to chance.

MATERIALS

Data were taken from tracings of lateral head films taken on the Broadbent-Bolton roentgenographic cephalometer, using the library of films built up through the routine x-raying of clinic patients in the Division of Orthodontics, College of Dentistry, University of California. A few films taken for orthodontists in the San Francisco Bay area were also included; regardless of the source, only films taken prior to orthodontic treatment were used. In all, 90 cases went into the study, 61 of which were females, and only 29 of which were males. Although the staff of the Division contemplates extending the study of the overbite problem to include measurements other than those reported here, and to include younger age groups, this study is limited only to individuals having no remaining deciduous teeth in the mouth, so that it might concern primarily the age group with which orthodontists commonly work.

METHODS AND OBSERVATIONS

On each of the 90 head films, the dimensions indicated in Fig. 1 were taken. *A* is the distance from gonion to the summit of the head of the condyle, and therefore includes the condylar process and the head of the condyle. This is called "Condyle-Gonion Height" in subsequent charts. *B* is the distance from the lowest point on the semilunar notch to a line tangent to the lower border of the mandible, measured parallel to the posterior border of the ramus and labeled "Ramus Height." *C* represents the distance between the hard palate or floor of the nose and a line tangent to the lower border of the mandible, and for the lack of a better term, is called "Molar Height." It is measured through the buccal groove of the maxillary first molar perpendicular to the occlusal plane, and may be taken as a measure of intermaxillary space. Total face height is the distance from nasion to gnathion, and lower face height is the portion of this line inferior to the anterior nasal spine. It has been generally assumed that lower face height as defined above decreases as the severity of the overbite increases, and the measurements support this assumption. All measurements were checked by a second observer.*

Each case in the study was classified as to severity of overbite as shown in Fig. 2; all head films were taken with the teeth in centric occlusion, and if the incisal edge of the mandibular incisor met the maxillary incisor at, or incisal to, a line 1.5 to 2.0 millimeters from the incisal edge of the maxillary central incisor, the overbite was called "slight." If the mandibular incisor occluded gingival to this line but incisal of the cingulum of the maxillary incisor, the overbite was called "medium." The overbite was designated as "severe" in every case where the mandibular incisor met the cingulum of the maxillary incisor or the gingival tissue lingual to it. The fact that 66 out of 90

*No correction for the slight size distortion which is inevitable in these films was undertaken. While this is readily done, the groups under consideration differ only with respect to overbite and intermaxillary space and not in over-all size or age, so that they are affected to the same extent by size distortion.

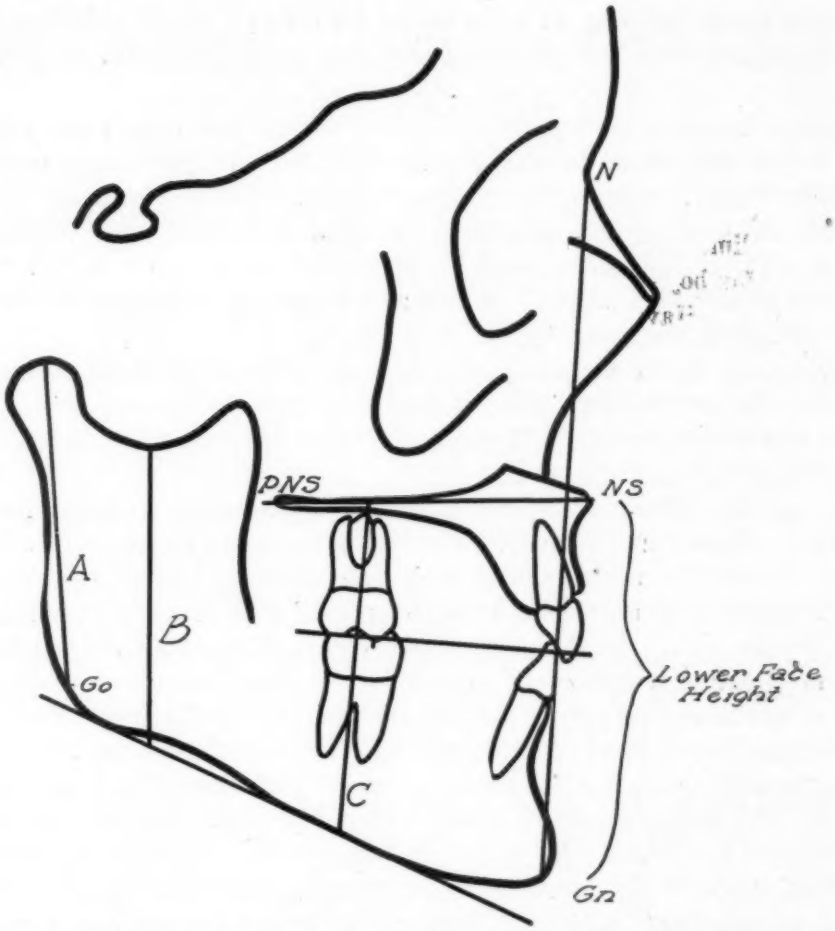

Fig. 1.—The dimensions taken from head films of every individual in the study: *A* is the vertical height of the ramus from the angle of the jaw to the summit of the mandibular condyle; *B* represents the height of the ramus proper; *C* represents intermaxillary space in the molar region; *Lower Face Height*, intermaxillary space in the incisor region. See text for detailed description of measurements.

DEGREE OF OVERBITE

Fig. 2.—Showing the method of classifying subjects with respect to degree of overbite, depending upon relation of incisal edges of mandibular incisors to lingual aspect of maxillary central incisors.

orthodontic cases (see Fig. 4) have either medium or severe overbites testifies to the frequency with which the closed bite is encountered in orthodontic practice.

It was necessary to determine whether or not sex differences exist with respect to the dimensions in question, since if they did they might obscure the facts under consideration. The sample was accordingly segregated as to sex, and means and standard deviations were calculated for each sex. No significant difference attributable to sex could be discovered, with respect to age or to the dimensions enumerated above. Means and standard deviations of the means for boys and girls are shown in Fig. 3.

Having met the possible objection that sex differences might play an untoward role, the sample was then broken down into three categories: slight, medium, and severe overbite. Means and standard deviations of means for these three groups are shown in Fig. 4.

Some of the differences shown in this table are small, while others appear to be large. Before any importance can be attached to any of them, it is first necessary to test the magnitude of each difference for statistical significance.*

No significant difference can be demonstrated with respect to the ages of the various groups, so age, like sex differences, can be dismissed from consideration.

As most orthodontists might suspect, the distance between the nose and the chin is substantially larger in individuals with a slight overbite than it is in those with medium or severe overbites (Fig. 4). The difference between the mean for slight overbite and that for medium overbite, amounting to 6 mm., is highly significant, i.e., the odds against chance being responsible for this difference are better than 99 to 1. The same holds true with respect to the difference (exceeding 7 mm.) between the mean for slight overbite and that for severe overbite. There is no significant difference between the means for medium overbite and severe overbite.

Total face height is affected in essentially the same fashion by the degree of overbite as is lower face height; the differences between means for different categories are of about the same magnitude as found between means for lower face height, and significance of difference was found to follow the same pattern.

The means shown in Fig. 4, which were just reviewed, show that the intermaxillary space is diminished in the anterior part of the mouth in closed-bite cases, and that the lack affects the vertical dimension of the entire face. The reduction of intermaxillary space also obtains in the molar region, as indicated by the means designated as "Molar Height." The difference of slightly more

*The "t" test of "Student" was used for testing significance of difference. Designed especially for small samples, it is a more rigorous test than those more commonly used. Differences with respect to condyle-gonion and ramus height were tested with the less rigorous method, in order to give Diamond's concept the benefit of the doubt.

It will perhaps suffice to point out that in considering the size of the difference between two average values (or better, two means), we consider the possibility that chance alone could account for the difference, rather than some inherent difference between the two groups under comparison.

It is never possible to say categorically that chance *is not* responsible for the difference, but it is possible to state with accuracy the *probability* of chance being responsible. If the odds are 20 to 1 against chance being responsible for a difference between two means, that difference is said to be "significant," and the assumption that the two groups are fundamentally unlike is warranted. If the odds against chance are 99 to 1 or better, the difference is said to be "highly significant." The greater the difference, obviously, the less likelihood there is that chance is responsible for it. The role of chance also decreases with variability within the groups under comparison.

DIFFERENCES IN FACIAL DIMENSIONS BASED ON SEX

	GIRLS	BOYS
No. in Sample	61	29
Age	15.1 ±0.43	14.5 ±0.60
Condyle-Gonion Height	55.52 ±0.54	56.53 ±1.24
Ramus Height	48.53 ±0.48	50.16 ±0.81
Molar Height	54.65 ±0.55	55.79 ±1.70
Total Face Height	112.63 ±0.93	116.00 ±1.79
Lower Face Height	61.91 ±0.82	63.91 ±1.40

Fig. 3.—Showing average values for males and females with respect to dimensions under study. None of the differences is statistically significant.

DIFFERENCES IN FACIAL DIMENSIONS BASED ON DEGREE OF OVERBITE

	SLIGHT OVERBITE	MEDIUM OVERBITE	SEVERE OVERBITE
No. in Sample	24	27	39
Age	15.8 ± 0.66	14.5 ±0.51	14.6 ±0.60
Condyle-Gonion Height	55.73 ±1.06	56.56 ±0.98	55.60 ±0.81
Ramus Height	49.23 ±0.81	49.24 ±0.70	48.82 ±0.70
Molar Height	57.50 ± 1.14	54.35 ±0.63	53.94 ±0.76
Total Face Height	118.67 ±1.67	112.44 ±1.18	111.55 ±1.33
Lower Face Height	67.64 ±1.41	61.70 ±0.80	60.01 ±1.07

Fig. 4.—Average values for three different degrees of overbite; there is no significant difference with respect to age, condyle-gonion height, or ramus height. Differences between means for "Slight Overbite" and "Medium Overbite" are statiscally significant with respect to molar height, total face height, and lower face height. Differences between means for "Slight Overbite" and "Severe Overbite" are significant with respect to molar height, total face height, and lower face height.

than 3 mm. between mean molar height for slight overbites and mean molar height for medium overbite is statistically significant. Obviously, then, the difference between mean molar heights, slight and severe overbites, is also significant. Once again, the difference between the means for medium and severe overbites is not significant.

If Diamond's view that deficient growth in length of the mandibular ramus is the cause of deficient intermaxillary space were correct, we should find either condyle-gonion or ramus height, or both, to be smallest where the overbite is severe, and to be progressively larger with medium and slight overbite groups. Furthermore, one or both of these values should vary more or less directly with lower face height and total face height. We find actually that when the mean condyle-gonion values for slight and medium overbites are compared, the difference is the reverse of that required to substantiate Diamond's hypothesis, although the difference is too small to be significant. Furthermore, comparison of the two extremes—slight overbite and severe overbite—shows that the difference amounts only to 0.13 mm., obviously not a significant difference.

Comparison of the values for ramus height do no more to strengthen the hypothesis than do those for condyle-gonion. None of the differences between means for ramus height is significant.

DISCUSSION

This quantitative study of salient facial dimensions fails to substantiate the contention that development of ramus height is crucially important for the development of intermaxillary space, however desirable it may be for satisfactory facial contours.

If one were particularly anxious to make a case for deficient ramus-length growth as the cause of the closed bite, he might contend that the closed bite has its onset at some time when ramus-length growth is inhibited, and that later a growth "spurt" causes the ramus to catch up with the rest of the face, so that ultimately the rami of closed bite cases would be of the same length as those with slight overbites, and in such a study as this one the previous misadventure of growth would be obscured. While ingenious, this argument seems hardly tenable, since we could expect that this addition to the length of the ramus, early or late, would carry the body of the mandible away from the maxilla and increase denture space, with the posterior teeth erupting to take advantage of this increased space, with consequent reduction of anterior overbite. Dr. Diamond would seemingly agree with this latter point, since he says, "It is well known that, in the absence of opposing occlusal contact, teeth will continue in active clinical eruption."[2]

The frequent allusions to "growth-spurts" which are encountered in the dental literature are somewhat perplexing to those who work routinely with cephalometric films taken serially on growing children, for no such seesaw method of growth is to be observed in these accurately oriented records of craniofacial growth. There is no denying that this phenomenon of "springing up" and "filling out" is to be observed in other parts of the body, but there are many important differences between craniofacial growth and general bodily

growth, and too often it is blithely assumed that generalizations derived from observations elsewhere apply with equal force to facial growth, when direct observation of the phenomena of craniofacial growth would yield more reliable information.

Brodie's[3] exhaustive serial study of craniofacial growth shows unmistakably that there is a remarkable coordination between the variable sites of facial growth which maintains proportionality of the face from birth on, and no evidence of comparable validity has been produced subsequently to shake this concept of the constancy of the morphogenetic pattern of the human face. Furthermore, Brodie has extended this original study of normal growth patterns to consider abnormal patterns of growth, and has demonstrated that this constancy is to be observed not only in normals but in abnormals as well.[5] It is evident from this work that if some systemic factor capable of inhibiting facial growth were to come into play, it would not single out some particular area upon which to do its damage, but instead all sites of growth operative at the time would be mutually affected, with the result that there would be over-all dimunition of size, even to such an extent as to affect unfavorably the prognosis for even, uncrowded dental arches. This demonstration of craniofacial constancy of pattern shows clearly that previous beliefs relied too heavily upon misadventures of postnatal life to explain away the types of facial configurations which we call abnormal.

Two cases may be presented to demonstrate that it is quite possible for pronounced development of intermaxillary space to occur where length-growth in the ramus area has been deficient. In showing them, a device originally introduced by D'Arcy Thompson[6] has been employed. An evenly spaced system of intersecting lines is imposed upon the lateral view of a "normal" face, which becomes a sort of standard (Fig. 5). In subsequently considered individuals which are to be compared with the "normal," the lines are made to pass through the same points through which they passed in the norm, with the consequence that the lines are no longer parallel but converge or diverge, depending upon the differences in facial pattern between the norm and the individuals compared with it. Figs. 6 and 7 make this comparison, which is essentially qualitative in nature. The boy shown in Fig. 6 might be considered to have a normal facial pattern by some standards, but the orthodontist would look upon him as a difficult problem and an example of the much-discussed "double protrusion." The convergence of the horizontal lines in the region of the ramus shows that ramus height is relatively small. The divergence of these lines as the profile is approached shows that vertical development is pronounced, and it can be seen that overbite of the incisors is nonexistent.

The craniofacial pattern of the young woman of Fig. 7 could scarcely be considered normal by any standard. The departure from normal is, however, essentially the same as that seen in the previous figure, except that the distortion is more marked. Unlike so many patients with unfortunate deformities, she does not attribute the anomaly to some remembered incident of the past, but instead asserts that the deformity has been with her from birth. Once again there is extreme shortening of ramus length, with excessive development of vertical

dimension in the anterior part of the face. The presence of fixed prostheses in the anterior part of the mouth makes a determination of her natural overbite uncertain, but it seems safe to assume that it was slight. This case was considered too grotesque to be included in the sample upon which means and standard deviations were calculated, although the one of Fig. 6 was included.

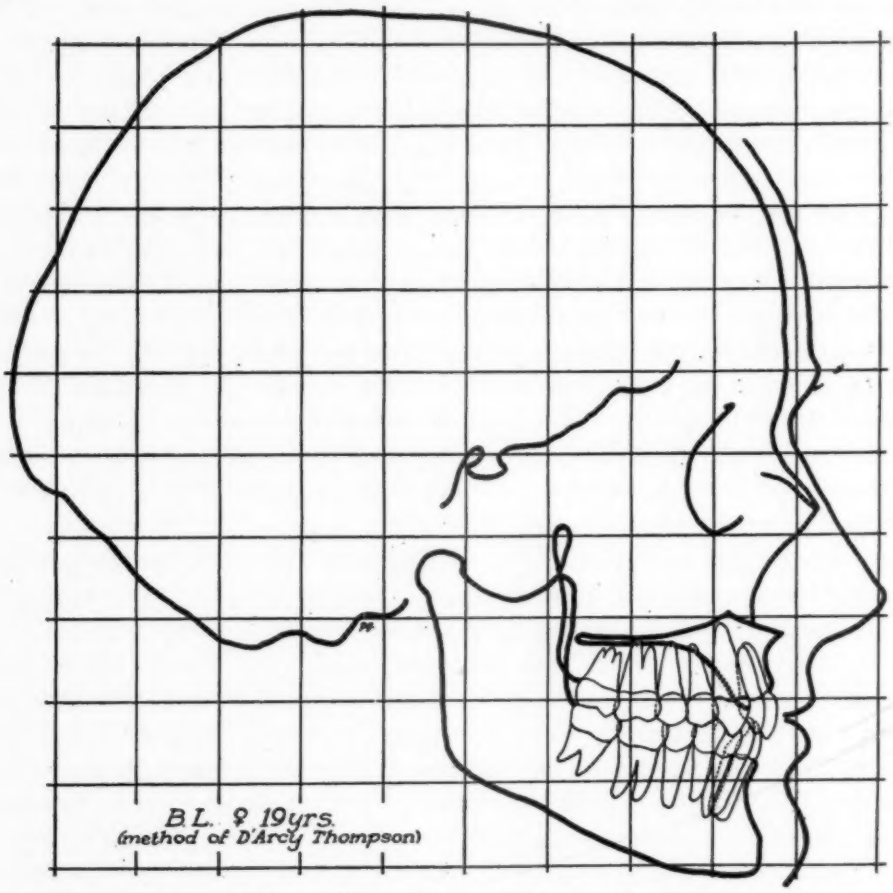

Fig. 5.—A "normal" craniofacial pattern with superposed grid, a device which facilitates comparisons with abnormals.

By comparing the significant dimensions of these patients with mean values for the orthodontic group as a whole, taking into account the degree of variation within the group as indicated by the standard deviation, one can see even more clearly that these two individuals have managed to attain vertical facial dimensions well in excess of the average.

Lower face height for the boy shown in Fig. 6 is 74.5 mm., while the mean for boys (Fig. 3) is only 63.9 mm. In 1,000 orthodontic patients comparable with the group reported here, we could expect to find only 81 individuals with as much or more lower face height, i.e., intermaxillary distance is particularly well developed. On the other hand, the opposite extreme with respect to ramus development is seen in the same individual; condyle-gonion height is only 41.0 mm., while the average for boys is 56.5 mm. Condyle-gonion height as slight as or slighter than this occurs only 11 times per thousand orthodontic patients.

This sort of evaluation is even more striking when applied to the young woman of Fig. 7. Her lower face height equals 75.0 mm., while the mean for females is 61.9 mm. One can expect to encounter only 23 individuals per thousand with lower face height as large or larger than this. On the other hand, her condyle-gonion height is only 39.5 mm., while the mean for females is 48.5 mm. A ramus as short or shorter than this will be encountered less than once in a thousand.

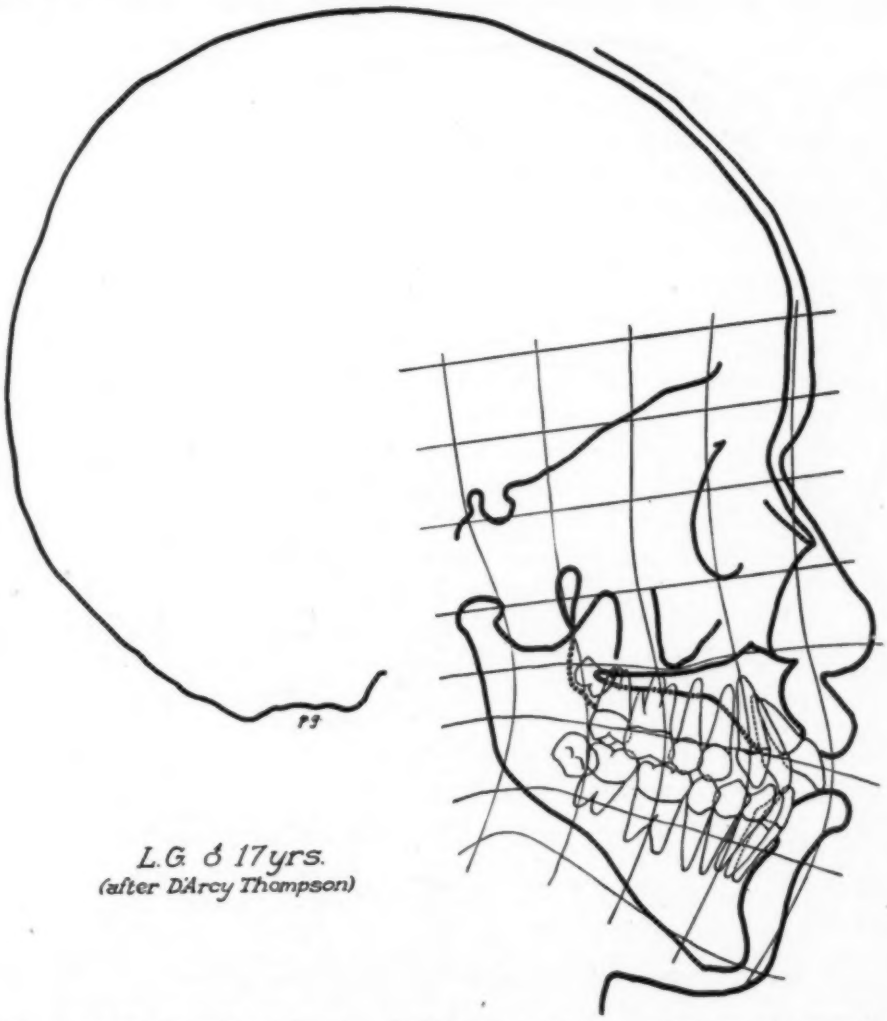

Fig. 6.—An orthodontic problem in an adolescent male; the distortion of the grid shows areas which are relatively small or large with respect to the "normal" of Fig. 5. In spite of underdevelopment of the ramus, a larger than average amount of intermaxillary space obtains, and there is little or no overbite.

Brodie[5] reports similar cases of micromandibular development and mentions that symphysis height is much greater than normal.

The case reported as Figs. 15 and 16 in this same paper,[5] in which both condyles were removed, seems to support the contention that growth sites anterior to the ramus and condyle are capable of increasing vertical facial dimensions, independent of the ramus and condyle, though not without impairment

of facial harmony. The surgical removal of the condyles prior to the cessation of growth activity in other parts of the face destroys the articulation of the mandible with the temporal bones and thus deprives the face of the effects of vertical development in the ramus and condyle. In the remaining period of growth the face becomes increasingly more like the congenital micromandibular defect or Vogelgesicht, since anterior growth sites continue their activity without the coordinating effects of the ramus and condylar areas. Significantly enough, there is also a warping of the mandibular body, suggesting strongly

Fig. 7.—A gross facial abnormality, with pronounced underdevelopment of the ramus, with pronounced development of the denture space.

that these anterior sites are capable of continuing their work of carrying the facial mask downward unaided by the growth sites situated posteriorly. Brash[7] has shown the importance of alveolar bone growth in increasing the vertical dimensions of the face.

Brodie and Thompson[4] have shown the importance of considering the relationship between the jaws in dynamic rather than in static terms, and may well have given the clue to the essential factor in the closed bite. They have established that the physiologic rest position is constant for a given individual, and that it imposes definite limitations upon vertical dimension as established by

prosthetic restorations. Consideration should be given to the possibility that tonus of the musculature associated with the human denture establishes the relative degree of opening between the jaws from early life on, i.e., relatively short muscles with more than average tonus would hold the mandible nearer the maxilla in physiologic rest than would muscles of slightly greater length or less tonus. It has been shown[8] that individuals with a closed bite have a decreased vertical dimension in the rest position as well, and that there is a high correlation between vertical dimension in rest and in centric.

SUMMARY AND CONCLUSIONS

A quantitative cephalometric study of orthodontic patients prior to treatment is reported, dividing the group of ninety cases into slight overbite, medium overbite, and severe overbite classes. It was found that total face height, lower face height, and intermaxillary space in the molar region are significantly less in closed bite cases, but that there is no significant difference between the groups with respect to the height of the ramus, measured either from the summit of the condyle to the gonial angle, or from the semilunar notch to the lower border of the mandible. Accordingly, Diamond's contention that decreased intermaxillary space and the consequent closed bite are due to lack of ramus growth in length is not substantiated by this study. Cases with marked deficiency of ramus growth are shown, in which more than average intermaxillary space obtains. It is concluded that while adequate growth of the mandibular ramus is of great importance if harmonious facial lines are to be attained, growth in this area has no direct relationship with the degree of development of intermaxillary space.

The author wishes to thank Mr. William A. Elsasser, senior student majoring in his Division, for recalculating all statistical parameters included in this study, thereby providing a check upon their accuracy.

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DIAGNOSIS AND TREATMENT PLANNING IN ORTHODONTICS

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WE SHALL consider this article as the second part or practical application of our article entitled "On the Classification of Dentofacial Anomalies," published in the September, 1945, issue of the American Journal of Orthodontics and Oral Surgery.

We should like to demonstrate that it is possible to apply in practice the afore-mentioned classification of anomalies in order to form a clear and complete concept of the case which we are going to treat. We insist again that in orthodontics a clear and complete concept cannot be simple but must be thorough. The apparent clarity of simple classifications is completely deceiving for it leaves us without understanding the scope of the problem which we pretend to solve.

A complete diagnosis of the dentofacial anomalies of a patient requires the composite use of various procedures and methods to permit us to check one method against the other and in this way reach the best possible understanding of the anomalies which we must correct.

Of course, a diagnosis and plan of treatment such as we advise require ample time for study. But, is it not justifiable to spend one or two hours obtaining a thorough knowledge of the clinical case, when we dedicate hours and hours over a period of one or two years to its treatment? If the diagnosis and plan of treatment are erroneous because we have made an incomplete study with simple plaster models and a classification which considers only one phase of the anomalies which we intend to correct, we will have to lose much time later modifying the treatment, besides causing possible injury to our patient.

Rather than present an extensive discussion of the diagnosis and plan of treatment in general, inappropriate for an article, we think it is more practical to give here some clinical histories, following the plan we use for their study. To do this, we must first be familiar with the orthodontic record which we ourselves use in the study of our patients (Table I).

EXPLANATION OF THE RECORD

We will begin the clinical history with the necessary data: name, age, etc. The height and weight are necessary to form some idea of the general growth of the child in relation to his facial growth which we are studying in more detail.

The pathologic history of the family is interesting because thereby we can detect hereditary anomalies (missing lateral upper incisors, supernumerary

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TABLE I. ORTHODONTIC RECORD

Name _____ No. _____

Age _____ Sex _____ Birthplace _____ Height _____ Weight _____

Father's name _____ Home address _____

Telephone _____ Recommended by _____

Family dentist _____ School _____

PATHOLOGIC FAMILY HISTORY _____

_____

_____

PATHOLOGIC HISTORY OF THE PATIENT _____

_____

_____

Respiration _____

Habits _____

Premature loss of deciduous teeth _____

Examination of the nose and throat _____

_____

Diet _____

_____

First appearance of the anomalies _____

_____

FACIAL DIAGNOSIS

Craniofacial measurements: Bizygomatic distance _____

Maximum width of the dental arch _____

Size of gonial angle _____

Incisor-mandibular angle _____

Photographs—Front view _____

_____

Profile view _____

_____

Radiographic profile _____

_____

Other extraoral roentgenograms _____

_____

Gnathostatic models _____

_____

ORAL DIAGNOSIS

Bogue measure _____

Diastemas in the temporary dentition _____

Measures in the permanent dentition—First premolars _____

Second premolars _____ First molars _____ Pont index—Length of the incisor arch _____ First premolars _____ First molars _____

Dental diagram _____

_____

Intraoral roentgenograms _____

_____

TABLE I—CONT'D

Classification of Anomalies

GROUP I: ANOMALIES OF THE SOFT PARTS _____

_____

_____

Muscular tonicity _____

GROUP II: ANOMALIES OF THE JAWS _____

Position and direction _____

_____

_____

Size and shape _____

_____

_____

GROUP III: ANOMALIES OF THE TEETH _____

Time _____

_____

_____

Position (gressions) _____

_____

_____

Direction (versions and rotations) _____

_____

_____

Size and shape _____

_____

_____

Number _____

_____

_____

GROUP IV: ANOMALIES OF THE TEMPOROMANDIBULAR JOINTS _____

_____

_____

GROUP V: ANOMALIES OF THE OCCLUSION _____

_____

_____

_____ Angle Classification _____

ETIOLOGY AND PATHOGENY _____

_____

_____

PROGNOSIS _____

_____

_____

Prophylaxis of new anomalies _____

_____

TABLE I—CONT'D

Plan of Treatment

Medical _____

_____

Surgical _____

_____

Myotherapeutic _____

_____

Prosthetic _____

_____

General orthopedic _____

_____

Mechanical _____

_____

_____

_____

Upper appliance placed _____ retired _____

Lower appliance placed _____ retired _____

New appliances or modifications _____

_____

_____

_____

_____

Upper appliance placed _____ retired _____

Lower appliance placed _____ retired _____

Secondary treatment _____

_____

RETENTION _____

_____

_____

Observations _____

_____

_____

_____

teeth, hereditary mandibular prognathism, etc.). Also it is necessary to note if the parents and brothers and sisters of the patient have or have had dentofacial anomalies or practice mouth breathing or suffer nasopharyngeal obstructions, as well as the general hereditary diseases and abnormal nutrition. In the pathologic history of the patient we note:

The type of breathing, oral or nasal.

The presence of bad habits, thumb-sucking, tongue-biting, cheek-chewing, tongue pressure against the anterior teeth, etc.

The presence of nasopharyngeal obstructions, adenoids, enlarged tonsils, deviated septum, etc.

The premature loss of deciduous teeth (without the use of space maintainers).

The loss of mesiodistal diameter of the teeth due to caries.

Eating habits and state of nutrition of the patient.

The date and the manner of appearance of the anomalies.

The general illnesses of the patient.

Fig. 1.—Izard index. The maximum width of the upper dental arch, in normal persons, should be equal to half the bizygomatic distance. To obtain the bizygomatic bone distance it is necessary to subtract 10 mm. of the distance taken with the craniometer on the face.

Following this, we record the data of the facial examination. First, the craniofacial measurements are taken directly on the patient by means of the Bertillon craniometer, as well as from the profile radiographs and the plaster casts. The most important measurements are: The bizygomatic distance, which should be twice the maximum width of the dental arch in normal persons (Izard index, Fig. 1) and permits diagnosis of the endognathism and exognathism. The size of the gonial angle, which normally should measure 120 to 130°, the enlargement of which (hypergonia) usually accompanies lower prognathism (Fig. 2, *a*). The size of the incisor-mandibular angle, formed by the line tangent to the lower border of the mandible and the line formed by the extended longitudinal axis

of one of the lower central incisors (H. I. Margolis); this angle, which normally varies between 85 and 93°, becomes more obtuse in the lower alveolar prognathism and more acute in alveolar retrognathism (Fig. 2, *b*).

Fig. 2.—Profile radiograph (taken by Dr. A. Delgado). Girl, 10 years old. *1*, Frankfort or eye-ear plane. *2*, Simon plane, perpendicular to the Frankfort plane at the orbitalia point, in normal persons passes through the cuspid of the upper canine and the gnathion, establishing the backward limits of the normal facial profile. *3*, Izard plane, perpendicular to the Frankfort plane passing through the glabella, establishing the forward limits of the normal facial profile. *a*, Gonial angle, formed by the straight line tangent to the posterior border of the vertical part of the mandible and the straight line tangent to the lower border of the body of the mandible. In normal persons this angle should measure 120 to 130°. *b*, Incisor-mandibular angle, formed by the same line tangent to the lower border of the mandible and the prolongation of the longitudinal axis of one of the lower central incisors; this normally measures 85 to 93°.

In the front view photograph, Fig. 3 (reduced to one-third or one-fourth the natural size), oriented by the Frankfort plane, we draw: (1) The median sagittal plane, which passes through the glabella, nasion, subnasion, prosthion, and gnathion. It permits diagnosis of the lateral anomalies of the lips (dextrocheilia, levocheilia) and jaws (dextrognathism, levognathism). (2) The Mayoral circumference, with the center at the spinal or subnasion point and the radius the subnasion-glabella distance, which in normal persons passes

through the two zygia (the points most distant from the sagittal plane of the zygomatic arch), the two gonia (the points most distant from the sagittal plane at the gonial angle), and the gnathion. It permits measurement of the two zones, nasal-orbital (glabella to subnasion) and oral (subnasion to gnathion) of the face, which remain equal for all ages and almost all races, and thus permits diagnosis of anomalies of size of the jaws (micrognathism, macrognathism). It also permits diagnosis of anomalies of position of the jaws (endognathism, exognathism) by the relation of the circumference with the zygia and gonia points (Fig. 3).

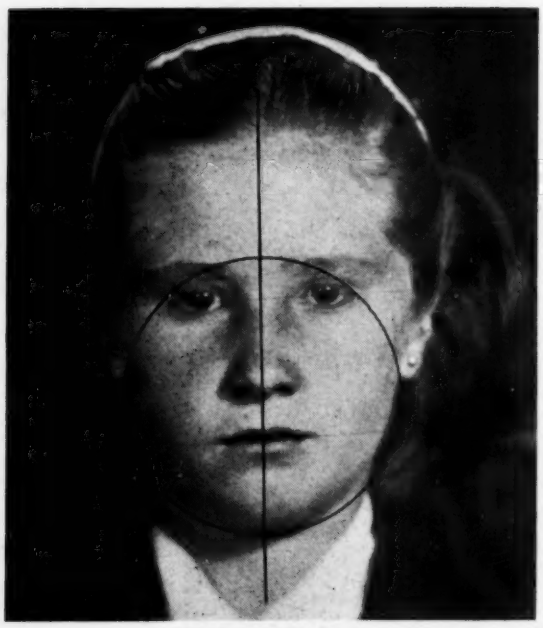

Fig. 3.

Fig. 4.

Fig. 3.—Photograph, front view. Median sagittal plane passes through the glabella, nasion, subnasion, prosthion, and gnathion. Mayoral circumference, with the center at the spinal, or subnasion point and the radius reaching the glabella, passes through the two zygia and two gonia and the gnathion. This permits measurement of the two zones, oral and nasal-orbital, of the face.

Fig. 4.—Photograph, profile view. The Frankfort plane passes through the orbitalia point and the tragion. Simon plane, perpendicular to the Frankfort plane at the orbitalia. Izard plane, perpendicular to the Frankfort plane and passing through the glabella. These two planes limit the oral profile.

In the profile photograph (Fig. 4) we draw: (1) The Frankfort or eye-ear plane, which passes through the orbitale and tragion points. (2) The Simon plane, perpendicular to the Frankfort plane at the orbitalia. (3) The Izard plane, perpendicular to the Frankfort plane and passing through the glabella. The Simon and Izard planes limit the oral profile, and permit diagnosis of anomalies of position and direction of the lips (procheilia, retrocheilia), of the jaws (prognathism, retrognathism), and in many cases those of the temporo-mandibular joints (procondylism, retrocondylism).

The radiographs with the profile marked by a lead wire (Carrea technique, Fig. 2), or other method, give us the means of diagnosing the anomalies of the soft parts in the facial profile; those of the jaws, by means of the Frankfort

plane and the planes of Izard and Simon, especially permit us to distinguish total prognathism and retrognathism from alveolar. From these profile radiographs we can also measure the gonial and the incisor-mandibular angles; and at the same time they permit an appreciation of the position of the condyles of the mandible and thus recognition of the anomalies of the temporomandibular articulations.

Under the heading "Other extraoral roentgenograms" we understand the x-rays of the mandibular angle, of the temporomandibular joints, and others which are necessary in order to make a specific diagnosis of some anomalies of the jaws and temporomandibular articulations. Also we can note here the interpretation of the carpal radiographs, when it is necessary to use this method in the diagnosis to study the general bone growth of the patient (Fig. 5).

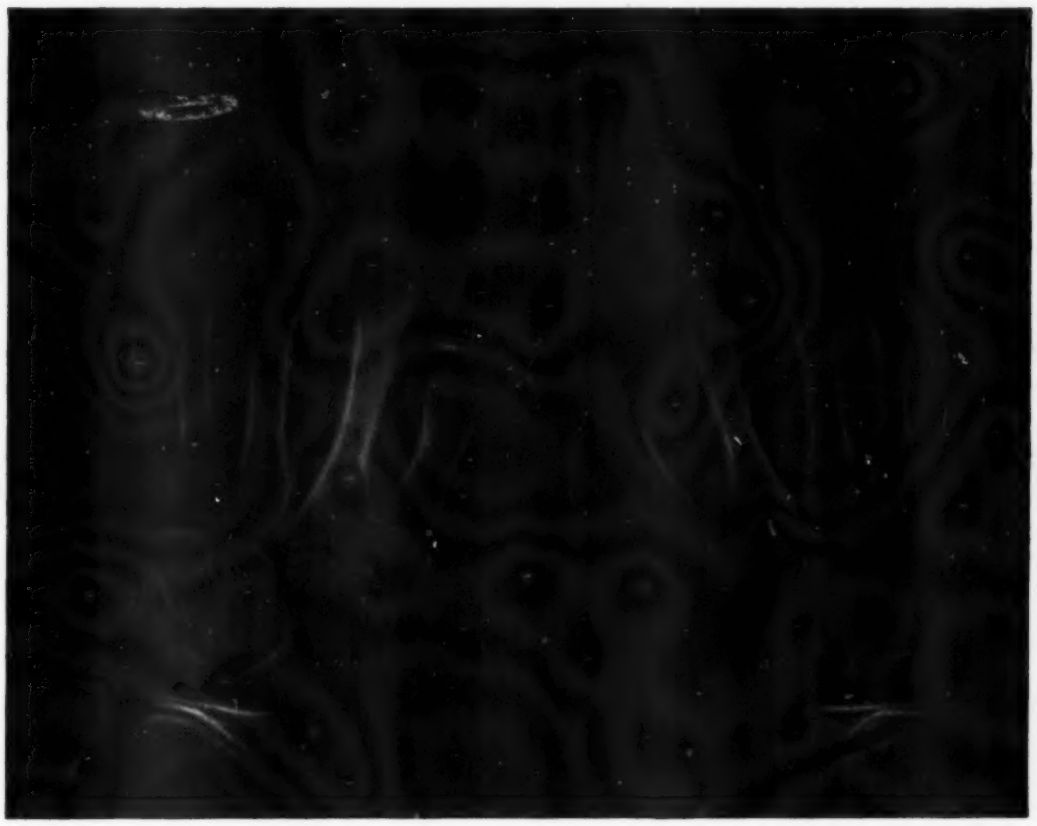

Fig. 5.—Carpal index.

The gnathostatic models, oriented according to the Frankfort plane and taken either by the Simon or Schwarz technique, permit us to diagnose correctly the anomalies of the jaws, teeth, and occlusion. The ordinary casts in many cases do not disclose the anomalies since they lack any references to the body planes.

In the oral diagnosis we note: The laws of Bogue for the temporary dentition: (1) The distance between the lingual surfaces of the second deciduous

upper molars at 5 or 6 years of age should be greater than 30 mm. (2) At the age of 5 or 6 years, the diastemas of growth between the temporary incisors should be present. The measurements of the permanent dentition, based primarily on Bogue's ideas and taken from an average of normal individuals, indicate the minimum normal distances that should separate the median occlusal grooves of the first and second upper premolars and the median point of the occlusal surface of the first upper molars, which are 35, 41, and 47, respectively. The Pont index gives us the minimum normal distance which should separate the first premolars and the first molars, in relation to the length of the incisor arch (Fig. 6).

TOTAL MESIODISTAL DIAMETERS OF THE INCISORS	DISTANCE BETWEEN FIRST PREMOLARS	DISTANCE BETWEEN FIRST MOLARS
18	22.5	28.1
20	25	31.94
20.5	25.5	32
21	26.25	32.82
21.5	27	33.77
22	27.5	34
22.5	28	35
23	28.75	35.94
23.5	29.5	36.88
24	30	37
24.5	30.5	38
25	31	39
25.5	32	39.8
26	32.5	40.9
26.5	33	41.5
27	33.5	42.5
27.5	34	42.96
28	35	44
28.5	35.5	44.5
29	36	45.3
29.5	37	46
30	37.5	46.87
30.5	38	47.6
31	39	48.4
31.5	39.5	49.2
32	40	50
32.5	40.5	50.80
33	41	51.5
33.5	42	52.3
34	43	53
34.5	43.5	53.9
35	44	54.5
36	45	56.4
37	46.25	57.8

Fig. 6.—Pont index.

We can obtain the dental diagram by drawing the parabolas advised by some authors (Bonwill, Hawley, Herbst, etc.), which we do not consider indispensable. By taking the maximum mesiodistal distance from the six anterior teeth, the Hawley celluloid charts can be used to detect the existing anomalies of the dental arch.

The intraoral roentgenograms are indispensable for investigating the position of the impacted teeth; to detect the existence of supernumerary teeth; to note missing teeth due to extraction or to lack of formation of the dental follicles

(a frequent occurrence in upper lateral incisors and third molars); the vitality of the teeth and the state of the periodontal tissues, indispensable data for a rational organization of the treatment.

With the foregoing data of the facial and oral examination, we can complete the classification of the anomalies.

To study the etiology and pathogeny we must note the congenital and acquired causes, local and general, which the detailed diagnosis of the anomalies and the pathologic history of the family and individual gives us; and thereby we may suppose the causes of the dentofacial anomalies of the patient. Among these causes we have mouth breathing, produced by respiratory obstructions in the nasal fossa, adenoids, or enlarged tonsils. The high respiratory obstacles, situated in the nasal fossa and the nasopharynx, often produce endognathism and upper prognathism, because of lack of equilibrium of the forces which are exerted on the teeth when the mouth is open to breathe (decrease of the pressure of the tongue within and the lower lip in front, and at the same time an increase of pressure from the cheeks, laterally). The low respiratory obstacles, enlarged tonsils, often produce lower prognathism because the individual pushes the mandible front to move the enlarged tonsils front and so facilitate breathing.

The premature loss of deciduous teeth and the loss of permanent teeth is another important cause of dentofacial anomalies. The bad childhood habits, thumb-sucking, chewing of the lips, tongue, or cheeks, sometimes may be due to respiratory obstructions which cause the child to adopt instinctively some positions to facilitate mouth breathing. The prolonged use of pacifiers and bottle feeding produces endognathism and upper prognathism. The decrease in the normal mesiodistal diameters due to caries may cause anomalies of position of the teeth and consequently of occlusion.

The prognosis of the dentofacial anomalies can be made by keeping in mind various factors: age and sex of the patient, class of the anomalies, stage of general growth, collaboration of the patient, etc.

When immediate treatment is not indicated, i.e., when there are missing temporary teeth and the permanent teeth have not yet erupted, we can note the prophylactic measures to avoid the aggravation of the anomalies during this time.

In the treatment planning we must give consideration to various orthodontic therapeutics: medical, surgical, myotherapeutic, prosthetic, general orthopedic, and mechanical, because it is necessary to have a complete picture in mind to avoid the purely mechanical aspect which is so common in the treatment of the orthodontic patient.

For the medical treatment it is necessary to advise the child on the value of the general laws of hygiene, sunshine, and fresh air, balanced diet, etc. The administration of calcium, phosphorus, and vitamin D is especially necessary to facilitate the changes in the bone structures which the orthodontic treatment requires.

The surgical treatment consists in the operations necessary in order to correct or help correct the dentofacial anomalies: exposition of impacted teeth, extirpation of labial frenum, extraction of supernumerary teeth, extraction of

temporary teeth (the normal fall of which has been delayed, thus impeding the eruption of the permanent ones), the extraction of permanent teeth in extreme cases, as the first premolars in total or alveolar upper prognathism and lower alveolar prognathism when they are very pronounced, or in adults. Also, sometimes more complicated operations are necessary, such as the resection of the condyles of the mandible in cases of exaggerated prognathism in adults, and the osteotomy of the vertical part or of the angle of the mandible in serious "open-bite" cases in adults.

The myotherapy treatment is of great importance in developing the lost muscle-tonicity of the mouth, and in helping in the correction of total lower retrognathism by means of exercising the pterygoid muscles.

The prosthetic treatment permits us to correct certain anomalies, such as: the jacket crowns on hypoplastic or microdontic teeth, bridges to replace the missing lateral incisors in cases where they have failed to form, fixed or removable bridges when there are missing permanent teeth, which must be supplied at the end of the orthodontic treatment, a requisite for good retention.

By general orthopedic treatment we understand the use of mechanical devices to discourage the bad habits, one of the causes of the dentofacial anomalies.

In respect to the mechanical treatment, we must select the appliances which we think best able to correct the dentofacial anomalies of the patient. Regarding this, we insist that it is an error to limit oneself to the use of the same orthodontic appliance and thus allow oneself to develop a purely mechanical concept regarding the whole orthodontic problem. In addition, the type of the anomalies, the age of the patient, etc., indicate the use of one appliance or another. In planning the treatment we must mentally review the distinct types of appliances, fixed and removable, of labial or lingual arch, head caps, etc., in order to select the one which permits us to better apply the forces which we intend to use in the treatment.

The most frequent use of fixed appliances should not permit us to forget the usefulness, under certain circumstances, of the removable appliances (during the interim of the fall of the deciduous teeth and the eruption of the permanent teeth and in adults to avoid the visibility of the appliances).

During the course of the treatment, if it be necessary to change the appliance, this should be noted in the record, as well as any secondary treatment which has followed. Also, record should be made of the retention appliances used.

It is not always necessary to complete each item of the record in every case, but it is always necessary to note the data which are considered important to make a complete diagnosis, a good classification of the anomalies, and an adequate plan of treatment.

THE APPLICATION OF THE CLASSIFICATION OF ANOMALIES AND THE RECORD MADE IN ACCORDANCE WITH IT, TO THE STUDY OF TWO CLINICAL CASES

CASE 1

Patient, woman, aged 22 years. Birthplace: Bogotá.

Pathologic Family History.—Ten brothers, three of whom had suffered with enlarged tonsils, two of these undergoing tonsillectomy. Pyorrhea in the father.

Pathologic History of the Patient.—Mouth breathing; enlarged tonsils, tonsillectomy at 20 years; hypertrophy of the labial frenum extirpated at 14 years; used pacifier until 7 years old; habit of biting the lower lip; loss of all the first permanent molars by extraction.

First Appearance of Anomalies.—At the beginning of permanent dentition.

Fig. 7.—Profile radiograph (Case 1). Upper and lower procheilia. Upper total and alveolar prognathism (the body of the maxilla is located more in front than normal in relation to the Simon plane and the alveolar part with the teeth is located more in front than normal in relation to the Simon plane and in relation to the body of the maxilla). Total lower prognathism (the mandible with its alveolar part more in front than normal, the gnathion slightly in front of the Simon plane; there are no deviations forward or backward of the alveolar part in relation to the body of the maxilla, because the incisor-mandibular angle is 90°). Hypergonia, gonial angle 136° (the size of the angle of the mandible increased, the normal being 120-130°).

Facial Diagnosis. Craniofacial Measurements.—Bizygomatic distance: 119 mm. Maximum width of the upper dental arch: 60 mm. (almost normal because the maximum width of the upper dental arch is approximately half the bizygomatic distance). Gonial angle: 136°. Hypergonia (increase of the size of the gonial angle, Fig. 7). Incisor-mandibular angle: 90° (exactly normal, Fig. 7).

Photographs.—Front view: (Fig. 8.) Levocheilia (deviation of the lips to the left of the sagittal plane). Lower levognathism (deviation of the mandible to the left). Levogeneism (deviation of the chin to the left). Micrognathism (decrease in the height of the

jaws; the distance between the spinal or subnasion and gnathion points is less than the distance between the spinal point and the glabella).

Profile view: (Fig. 9.) Upper and lower procheilia (lips more in front than normal, passing in front of the Izard plane). Upper prognathism (the maxilla in front of the Izard plane). Lower prognathism (the mandible located in front of the Simon plane).

Profile radiograph: (Fig. 7.) As in the profile photograph, here it is also possible to appreciate the upper and lower procheilia. Upper total and alveolar prognathism (the body of the maxilla is located more in front than the normal in relation to the Simon plane and the alveolar process with the teeth is located more in front than normal in relation to the Simon plane and in relation to the body of the maxilla). Total lower prognathism (the mandible with its alveolar process, more in front than normal, the gnathion is slightly in front of the Simon plane, there are no deviations forward or backward of the alveolar part in relation to the body of the maxilla, because the incisor-mandibular angle is 90°). Hypergonia, gonial angle 136° (increased size of the angle of the mandible, the normal being 120 to 130°).

Fig. 8.

Fig. 9.

Fig. 8.—Front view (Case 1). Levocheilia (deviation of the lips to the left of the sagittal plane). Lower levognathism (deviation of the mandible to the left). Levogeneism (deviation of the chin to the left). Micrognathism (decrease in the height of the jaws, the distance between the spinal or subnasion and gnathion points being less than the distance between the spinal point and the glabella).

Fig. 9.—Profile view. (Case 1). Upper and lower procheilia (lips more in front than normal, passing in front of the Izard plane). Upper prognathism (the maxilla in front of the Izard plane). Slight lower prognathism (the mandible located in front of the Simon plane).

Oral Diagnosis.—Measurements between the first premolars: 34 mm. Between the second premolars: 40 mm. (Normal measurements are 35 mm. and 41 mm., respectively.) Slight endognathism or narrowing of the maxilla.

Pont index: Length of the incisor arch: 30 mm. (Fig. 6). The corresponding distance for the first premolars in the index is 37.5 mm., but the actual distance in this case was 34 mm. The distance between the first molars should be 46.2 mm., but this could not be measured because the first molars had been extracted. These measurements were sufficient to establish the diagnosis of the slight endognathism without resorting to the use of parabolas of Hawley or Herbst.

In accordance with this data gathered from the pathologic history of the family and patient and the results of the facial and oral diagnosis, we can classify the anomalies of this case in the following manner:

Group I. Anomalies of the Soft Parts.—Levocheilia (lips deviated to the left side of the face). Levostomia (oral orifice deviated to the left). Upper and lower procheilia (lips deviated forward). Hypotonicity of the orbicularis oris muscle. Synechiecheilia (labial frenum hypertrophy).

Group II. Anomalies of the Jaws.—Position and direction: Slight upper endognathism (narrowing of the maxilla). Lower levognathism (deviation of the mandible to the left). Levogeneism (deviation of the chin to the left). Total and alveolar upper prognathism (maxilla deviated forward and the alveolar process with the teeth even further deviated in respect to the body of the maxilla). Total lower prognathism (mandible deviated forward).

Size and shape: Upper and lower micrognathism (decrease in the height of the jaws). Hypergonia (enlargement of the size of the mandibular angle).

Group III. Anomalies of the teeth.—Time: None. Position (gressions): Labiogression of the central and lateral upper incisors (located in front of the corresponding point in the normal dental arch). Distogression of the upper central incisors and of the lower left second premolar (situated distally from the normal). Mesiogression of all the canines, premolars, and molars of the upper dental arch, and the lower right second and third molars and lower left third molar (situated mesially from the normal). (Fig. 10.)

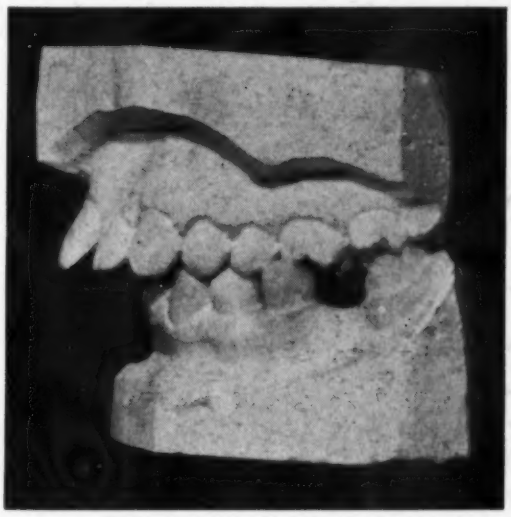

Fig. 10.—Dental casts (Case 1). Anomalies of the teeth and occlusion.

Direction (versions and rotations): Distolabial rotation of the upper central incisors (the distal surfaces of these teeth had rotated toward the lips). Mesiobuccal rotation of the lower left third molar (the mesial surface turned toward the cheek). Mesioversion of the upper second molars, lower right second molar, and lower third molars (these teeth are inclined mesially). (Fig. 10.)

Size and shape: None. Number: Missing by extraction—all the first molars and the lower left second molar.

Group IV. Anomalies of the Temporomandibular Joints.—Procondylism (forward deviation of the condyles of the mandible, manifested by the pronounced forward position of the mandible) (Fig. 7). Levocondylism (deviation of the condyles to the left and the consequent deviation of the mandible) (Fig. 8).

Group V. Anomalies of the Occlusion.—Mesioclusion of all the upper canines, premolars, and molars. Labioclusion of the upper central and lateral incisors. Hyperclusion of the lower central and lateral incisors (passing the plane of occlusion). Unclassifiable by the Angle classification, because all the first molars are missing. (Fig. 10.)

Etiology and pathogeny: Mouth breathing due to enlarged tonsils and possibly adenoids. Prolonged use of pacifiers, up to 7 years of age. Hypertrophy of the labial frenum. Habit of biting the lower lip. Premature loss of deciduous teeth and, later, loss of permanent first molars and the lower left second molar.

Prognosis: Rather favorable, except for the micrognathism (shortened height of the jaws) and hypergonia (enlargement of the mandibular angle).

Prophylaxis of new anomalies: Immediate treatment is indicated, and special attention to correct the mouth breathing.

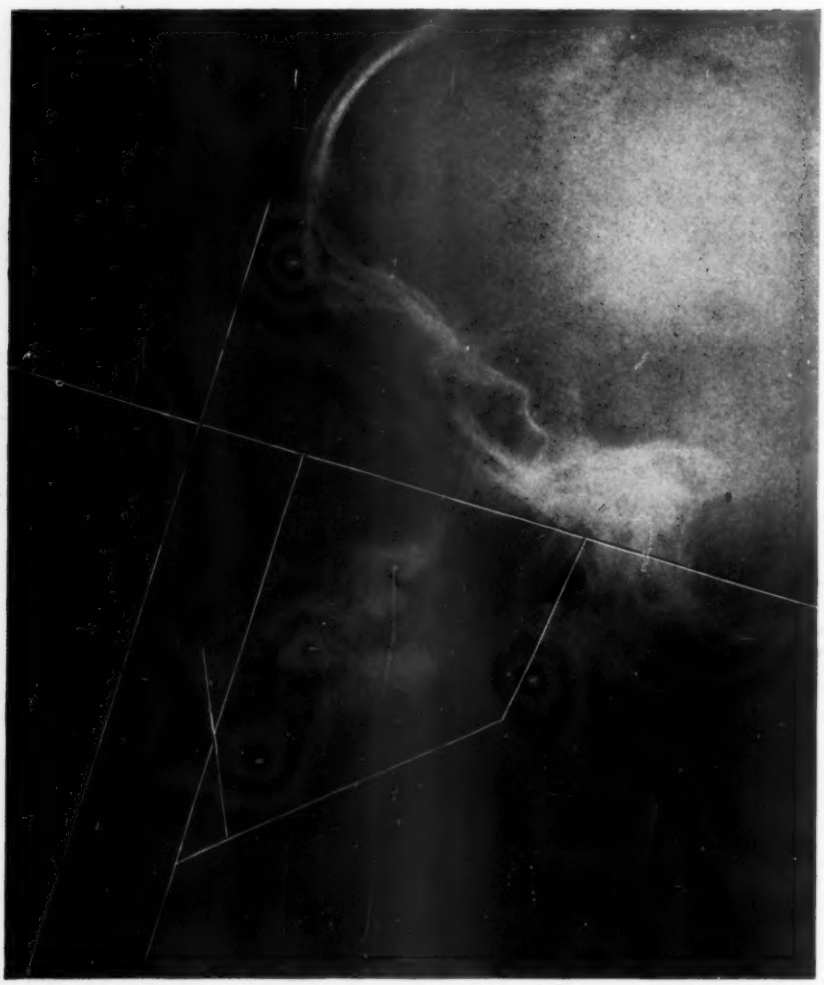

Fig. 11.—Profile radiograph (Case 2). Upper and lower procheilia (lips touching the Izard plane). Total upper prognathism with alveolar retrognathism (the body of the maxilla is located more in front than normal and the alveolar part with its teeth deviated lingually in relation to the body of the maxilla). Lower alveolar retrognathism, incisor-mandibular angle: 77° (the mandibular alveolar part with its teeth is deviated lingually in relation to the body of the mandible). Hypergonia, gonial angle: 139° (enlargement of the gonial angle which normally measures 120 to 130°.)

Plan of Treatment.—Medical: Administration of calcium, phosphorus, and vitamin D to facilitate the formation and reabsorption of bone during the treatment.

Surgical: Extraction of the two upper first premolars in order to permit the correction of the pronounced upper alveolar prognathism (the patient is 22 years old).

Myotherapeutic: Exercises of the orbicularis oris muscle. Use of the Rogers exerciser or the Friel disk.

Prosthetic: Bridge to replace the lower left second molar, after the mechanical treatment is completed.

General orthopedic: None.

Mechanical: Procedures for treatment of these anomalies by the edgewise, labiolingual, Atkinson, and McCoy techniques can be used. This case has been treated with a Johnson twin-arch upper appliance with bands on canines and four incisors, and intermaxillary hooks to produce a backward pressure on the incisors and canines, and so correct the alveolar prognathism; with Johnson twin-arch lower appliance with bands on the incisors and canines to correct hyperclusion, intermaxillary hook on the left side in order to exert transverse pressure to correct lower levognathism.

CASE 2

Patient, boy, aged 13 years. Birthplace: Bogotá.

Pathologic Family History.—Unimportant.

Pathologic History of the Patient.—Mouth breathing. Two deciduous molars lost at 11 years of age. Retarded fall of deciduous teeth.

First Appearance of the Anomalies.—At the age of 10 years the linguoclusion of the upper incisors was first noted.

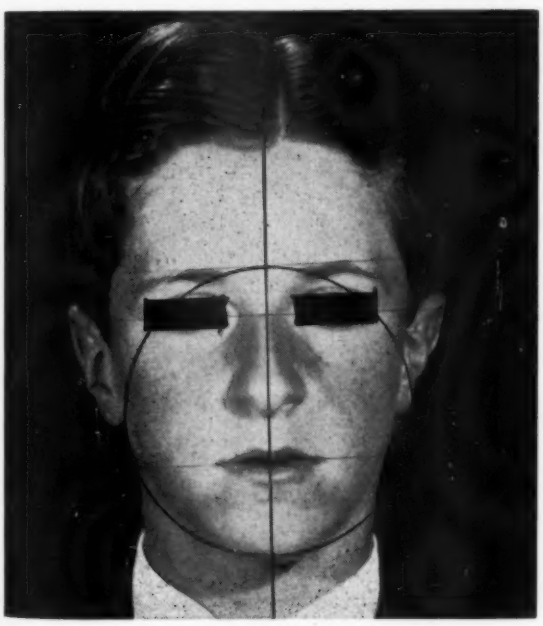

Fig. 12.

Fig. 13.

Fig. 12.—Front view (Case 2). Upper and lower endognathism (narrowing, with the jaws approaching the sagittal plane and the two zigia and two gonia lying within the circumference).

Fig. 13.—Profile view (Case 2). Upper and lower procheilia (lips more in front than normal, because they approximate the Izard plane). Total upper prognathism (the maxilla is located more in front than normal, because the whole upper lip reaches the Izard plane).

Facial Diagnosis.—Craniofacial Measurements.—Bizygomatic distance: 120 mm. Maximum width of the upper dental arch: 56 mm. Endognathism (narrowing of the upper dental arch so that it measures less than half the width of the bizygomatic distance). Gonial angle: 139°. Hypergonia (enlargement of the size of the gonial angle, which normally measures 120 to 130°). (Fig. 11.) Incisor-mandibular angle: 77°. Lower alveolar retrognathism (the alveolar process with the incisors and canines is deviated lingually in relation to the body of the mandible). (Fig. 11.)

Photographs.—Front view: (Fig. 12.) Upper and lower endognathism (narrowing, with the jaws approaching the sagittal plane and the two zygia and two gonia lying within the circumference).

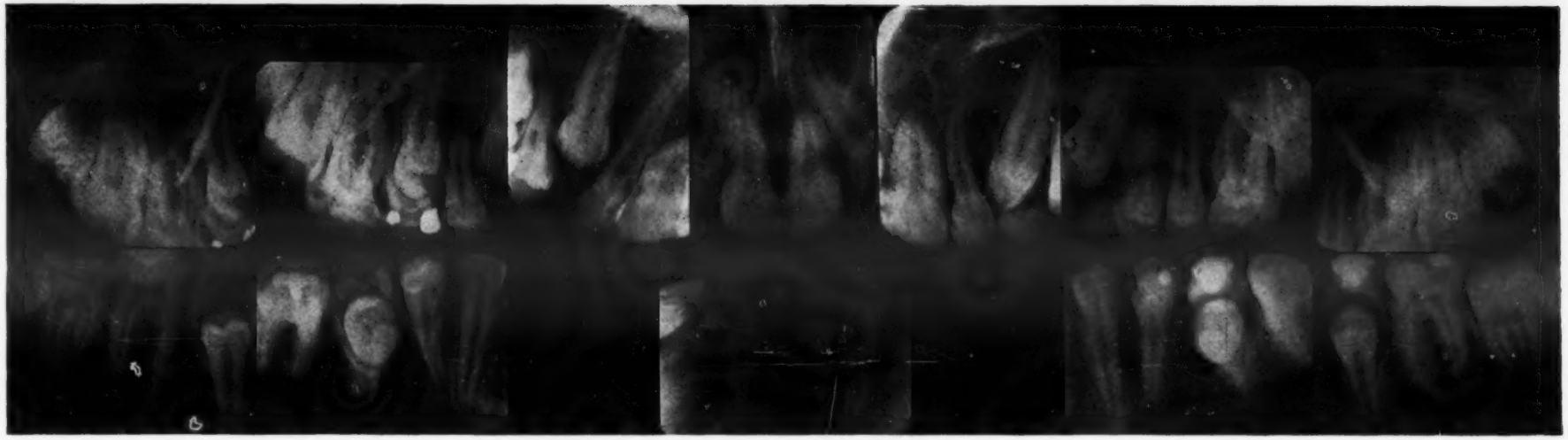

Fig. 14.—Intraoral roentgenograms (Case 2). The upper canines, the upper right second premolar, and the lower second premolars included in good position. Delayed fall of deciduous teeth and delayed eruption of permanent teeth.

Profile view: (Fig. 13.) Upper and lower procheilia (lips more in front than normal, because they approximate the Izard plane). Total upper prognathism (the maxilla is located more in front than normal, because the whole upper lip reaches the Izard plane).

Profile radiograph: (Fig. 11.) Upper and lower procheilia (lips touching the Izard plane). Total upper prognathism with alveolar retrognathism (the body of the maxilla is located more in front than normal and the alveolar process with its teeth deviated lingually in relation to the body of the maxilla). Lower alveolar retrognathism, incisor-mandibular angle: 77° (the mandibular alveolar process with its teeth is deviated lingually in relation to the body of the mandible). Hypergonia, gonial angle: 139° (enlargement of the gonial angle which normally measures 120 to 130°).

Oral Diagnosis.—Measurements between first premolars: 36 mm. Measurements between the first molars: 47 mm. (normal).

Pont index: Length of the incisor arch: 33 mm. (Fig. 6). The corresponding normal measurements between first premolars is 41 mm.; in this case the measurement is 36 mm. The corresponding normal measurement between the first molars is 51.5 mm. and in this case the measurement is 47 mm. Endognathism (narrowing of the dental arch).

Intraoral roentgenograms: (Fig. 14.) The upper canines, the upper right second premolar and the lower second premolars included in good position. Delayed fall of deciduous teeth and delayed eruption of permanent teeth.

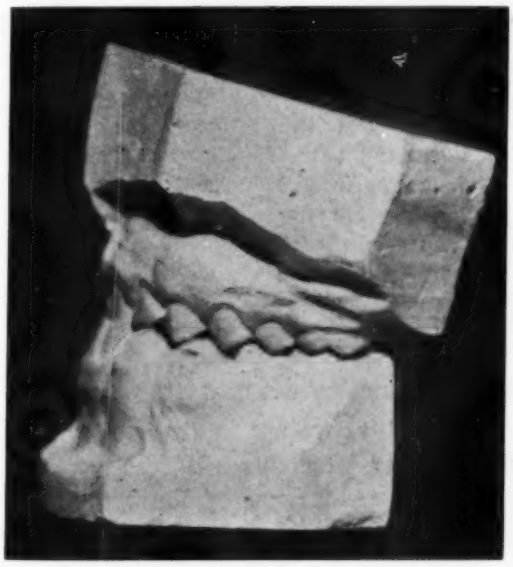

Fig. 15.—Dental casts (Case 2). Anomalies of the teeth and occlusion.

In accordance with this data gathered from the pathologic history of the family and patient and the results of the facial and oral diagnosis, we can classify the anomalies of this case in the following manner:

Group I. Anomalies of the Soft Parts.—Upper and lower procheilia (lips deviated forward). Muscular tonicity: normal.

Group II. Anomalies of the Jaws.—Position and direction: Upper and lower endognathism (narrowing of the jaws). Total upper prognathism with alveolar retrognathism (body of the maxilla deviated forward, but the alveolar process deviated backward). Lower alveolar retrognathism (the alveolar process with its teeth is deviated backward in relation to the body of the mandible).

Size and shape: Hypergonia (increase in the size of the gonial angle).

Group III. Anomalies of the Teeth.—Time: Delayed fall of deciduous teeth, with upper right second molar, upper left canine, and the four lower molars persisting.

Position (gressions): Ingression of the two upper canines, upper right second premolar, and the four lower premolars. Distogression and ingression of the upper right lateral incisor (deviated distally and toward the body of the jaw).

Direction (versions and rotations): Distoversion of the upper lateral incisors (inclination of the crowns distally). Linguoversion of the upper and lower incisors and the lower canines (the crowns inclined lingually). Distolabial rotation of the two upper lateral incisors and the upper left first premolar (the distal surface has turned toward the lips) (Fig. 15).

Size and shape: None. Number: None.

Group IV. Anomalies of the Temporomandibular Joints.—None.

Group V. Anomalies of Occlusion.—Linguoclusion of the upper incisors (these teeth occluded lingually in respect to the lower ones). Hypoclusion of the upper lateral incisors and the lower right canine (these teeth do not reach the plane of occlusion). Angle classification: Class III, subdivision (unilateral) (Fig. 15).

Etiology and pathogeny: Mouth breathing. Retarded fall of the deciduous teeth.

Prognosis: Favorable, except for the hypergonia.

Prophylaxis of new anomalies: Immediate treatment is indicated, and correction of breathing habit.

Plan of Treatment.—Medical: Administration of calcium, phosphorus, and vitamin D to encourage the eruption of the retarded permanent dentition. Sun baths and fresh air recommended.

Surgical: None. Myotherapeutic: None. Prosthetic: None. General orthopedic: None.

Mechanical: Procedures for treatment of these anomalies by the edgewise, labiolingual, Atkinson, and McCoy techniques can be used. This case has been treated, first, with upper lingual appliance, with high crowns instead of bands, to open the bite in order to correct linguoclusion of the upper incisors; later, upper and lower Johnson twin-arch appliances with coil springs to correct the linguoversion of the upper and lower incisors and the lower canines and to make place for the upper canines.

In both cases we preferred to have gnathostatic casts in place of ordinary ones. The gnathostatic casts with the photographs and profile roentgenograms, oriented to the Frankfort plane, gave a unity to our diagnosis.

The diagnostic methods that we use in studying our patients, as well as the record, are secondary. Other procedures of diagnosis may be employed, depending upon the individual preference of the orthodontist; but regardless of the diagnostic procedure the anomalies can always be classified into the five groups: soft parts, jaws, teeth, temporomandibular joints, and occlusion. Our purpose in this article is to demonstrate that a clear and complete concept of the clinical case is formed by means of this classification.

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ON THE DIAGNOSIS AND TREATMENT OF "DISTOCLUSION"

GEORGE M. ANDERSON, D.D.S., BALTIMORE, MD.

OUR ability to correct malocclusion is lowered in a final analysis by our inability to have a reasonably full understanding of the problem. I have come to the conclusion fairly often that I am not sure just what I am trying to improve and it is very much to the credit of the technical initiative of members of our specialty that we are able to justify public acceptance of our work. However, I doubt, in a fair number of the instances where I use intermaxillary elastics, that I have a clear idea of how they work or exactly what they do. They just seem to work to our advantage. It is not so much the use of the elastics but the type of case of which they become a vital treatment part which has me confused. It is a problem with which I am constantly faced, and while I seem to go along right well during active treatment, some of my apparently well-treated cases later do not look so well. My procedures are generally the same, so it must be that the cases that I diagnosed and treated as distoclusion were of another family. I seem not to be alone in this confusion, for we have heard a competent orthodontist say that few of his results suit his ideas of successful treatment. While I believe he assumed a too critical attitude, there is no doubt from the evidence that his efforts had been but temporarily rewarded. Therefore, it must have been unknown or unrecognized factors continuing their existence that contributed to the instability. The conclusion must be that diagnosis was as weak as treatment procedures were strong. This proves once again how our mechanical ingenuity has dominated our case histories. This is particularly true with that condition we have been taught to view as distoclusion. A majority of orthodontists can take a malocclusion which, under the usual methods of diagnosis, is an apparent distoclusion and produce what appears to be a useful and well-appearing arrangement of the teeth. However, a majority of orthodontists will, I believe, admit that they have no sure way of knowing beyond a reasonable doubt what situation they are dealing with or the causes of it. They are not sure of permanency of result. Their usual procedure of diagnosis has as its foundation a study of the relationship of the first permanent molar, and if the mesiobuccal cusp of the maxillary first molar is mesial to the buccal groove of the mandibular first molar, it is assumed in most instances to be distoclusion. Some practitioners extend their diagnostic efforts a bit, but Angle's molar relationship is still the essence of most distoclusion acknowledgment.

Some years ago I made the statement in writing* that I did not believe too much in what was represented to be distoclusion and that what often appears to be distoclusion is in actuality merely an apparent distoclusion. At that time

Read before the Philadelphia Orthodontic Society, Philadelphia, Nov. 19, 1945.

*Mesioclusion of the Maxillary Teeth, AM. J. ORTHODONTICS AND ORAL SURG. 24: 967, 1938.

I submitted certain cases to support my views, and further observations and experiences have confirmed a good part of my previous viewpoint. For every case of true distoclusion there are many of apparent distoclusion (Fig. 1). The realization of this has been a great aid. It has broadened my mental approach to distoclusion from the acceptance of everything with a certain molar relationship as distoclusion, and while molar relationship still intrigues me I consider it as but a symptom of change and but a part of the evidence as to the type of malocclusion that exists.

What is distoclusion? I cannot imagine a more distressing question to be put to me in case I had to submit to an examination as a requirement for my right to continue in practice. I would be no end embarrassed. Distoclusion, as we have recognized it, ought to mean either that the mandible is actually short,

Fig. 1.—Right and left views of distoclusion(?). Molar relationship and protrusion of incisors indicate a typical Angle Class II, Division 1. However, this case was diagnosed and is being treated as a mesioclusion of the maxillary teeth. The diagnosis was based in part upon an existing good facial balance except for a "poutiness" of the upper lip section and certain conditions shown by the x-ray. (See Fig. 2.)

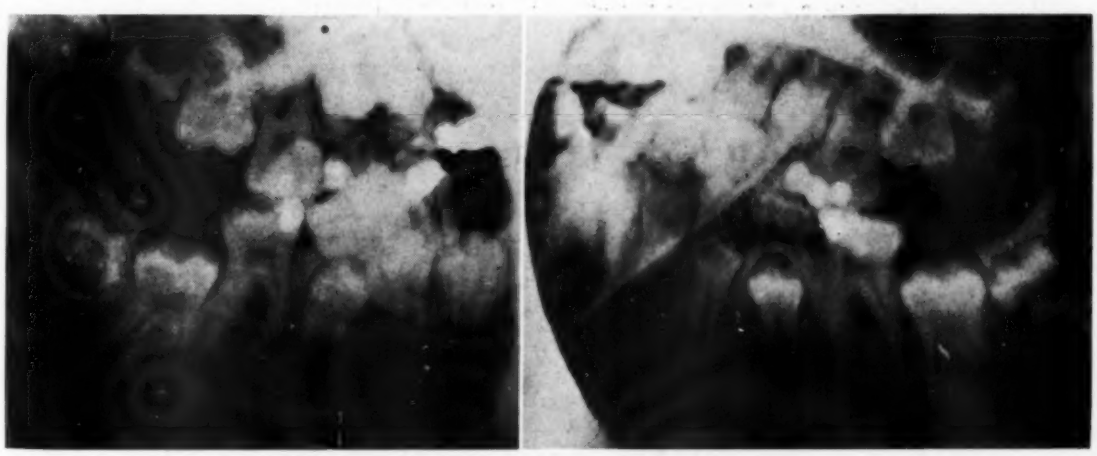

Fig. 2.—Right and left radiographs of the posterior teeth of case shown in Fig. 1. The lower molars do not seem crowded as in a deficient mandible or posterior displacement of the teeth as would be found in true distoclusion. In addition, the upper molars are definitely *on a forward slant* when ordinarily they are found to slant distally. The upper second molars are further erupted than are the lower second molars, which would be a condition to be expected due to the forward positioning of the upper molars, giving them greater freedom to erupt.

horizontally and vertically deficient in size, or, if not that, that the mandible may be considered to be of full size according to age but the entire dental arch posteriorly placed upon it. In either instance, deficient bone size or posterior displacement, the teeth ought to be crowded through lack of available space. However, we see very frequently in what appears to be a distoclusion a fine lower dental arch with a highly desired evenness of the teeth, with x-rays frequently showing but little posterior crowding of the molars (Fig. 2). Through inheritance we do see deficient mandibles, and I believe I have seen evidence reasonably often of what appears to be inhibited growth on one or both sides of the mandible, but for every one of these there have been many others which had tooth arrangement of apparent distoclusion without mandibular deficiencies or inhibitions. I am, therefore, of the opinion that many malocclusions which we have diagnosed on molar arrangement only as distoclusion are not distoclusion unless we are simply satisfied to use that term for want of a better one to indicate malrelation of the molars.

Besides the bilateral apparent distoclusion, we frequently see a unilateral type (Fig. 3). This has always seemed a rather odd situation because, if the condition is actually a distoclusion, it would seem that there should be a considerable mandibular facial disharmony. However, little is noted. My experience has been that so-called unilateral distoclusion infrequently exists. A condition similar

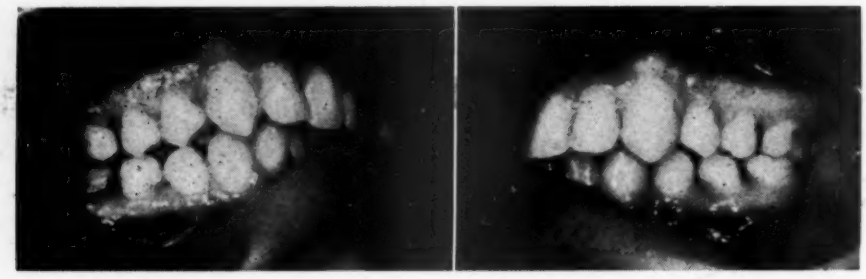

Fig. 3.—Right and left view of unilateral distoclusion(?).

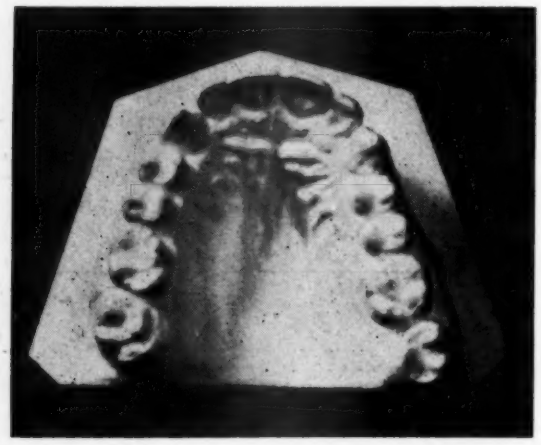

Fig. 4.—Occlusal view of case shown in Fig. 3. Note symmetry of arch form, but there is a very positive mesial position of the right side as compared with the left side. The case is not unilateral distoclusion but a mesial position of the upper right.

to it does exist, however, and a plaster cast of the maxillary arch will show an asymmetrically developed maxilla with the teeth on one side considerably forward to the teeth on the other (Fig. 4). When joined in maxillary and mandibular relationship the condition as shown by the molars is apparently distoclusion, but it cannot be treated successfully as a distoclusion. A diagnosis of that based upon molar relationships will be misleading and result in failure.

There is a recurring item in many types of human malocclusion which I believe has greater significance than we have admitted. I refer to the overbite. There are men who say a bite plate should never be used, indicating their belief, by such a statement, that an overbite is a rarity. Yet, in the gradual accumulation of observations regarding distoclusion, I am thoroughly convinced they are wrong. I do not know what causes an overbite, but I do know that it

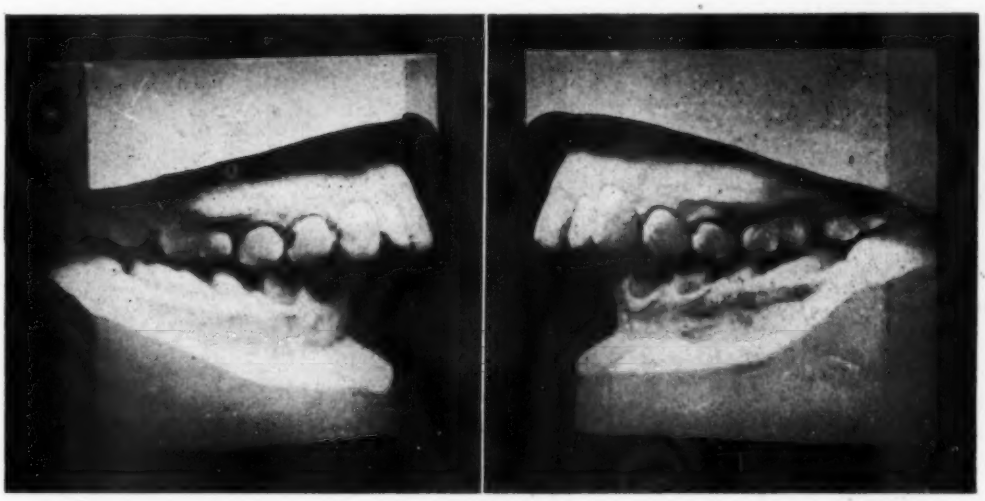

Fig. 5.—Right and left view of distoclusion(?). This case had been treated for some time as Class II, Division 1, Angle. The photographs illustrate that the condition had not been improved. Facial balance being good except for a "poutiness" of the upper lip section and a "cuppiness" below the lower lip which condition was thought to be a result of the pronounced overbite, it was decided that this was not distoclusion even though the molar arrangement said so, and the case was treated as a mesioclusion of the upper and by the extraction method. The result ten years later is excellent, with a most pleasing facial appearance.

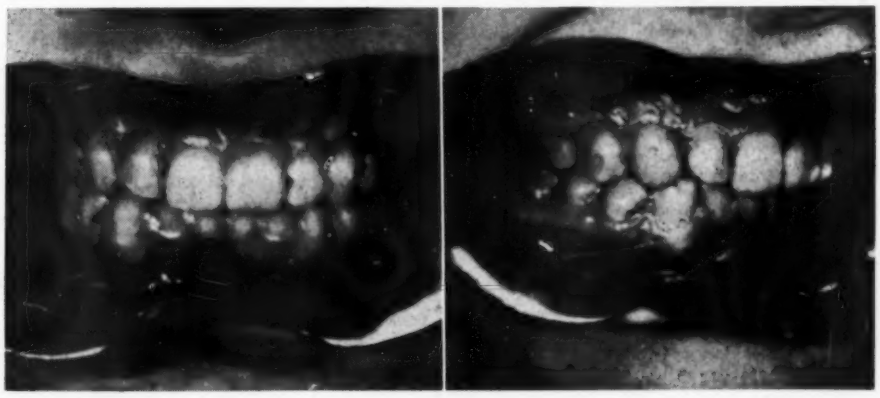

Fig. 6.—Result following treatment by the extraction method. Procedure was to bring the upper anterior teeth back, closing extracted premolar spaces, leaving the molar arrangement alone.

is often found. It may be that it is a symptom with developmental and growth deficiencies in the background. So long as it exists, the correction of the malocclusion which it accompanies is problematical. It would seem, therefore, that efforts toward a better appreciation of the overbite would be as advantageous to the specialty as the mechanical efforts in the development of appliance therapy have been.

While in the past few years we have learned much about the mesial positioning of the maxillary teeth and their relation to the mandibular teeth, and this undoubtedly has solved a part of the so-called distoclusion problem, it is true that in many instances of diagnosed mesioclusion the malocclusion has been complicated by an extreme overbite. The mesial position of the maxillary teeth creates an apparent distoclusion of the molars (Fig. 5). Yet if the mesial position of the maxillary teeth is recognized and premolars are extracted and the anterior teeth retracted with the molars left in apparent distoclusion, facial balance is good, providing a change of occlusal vertical arrangement or correction of the overbite has been a part of the treatment (Fig. 6).

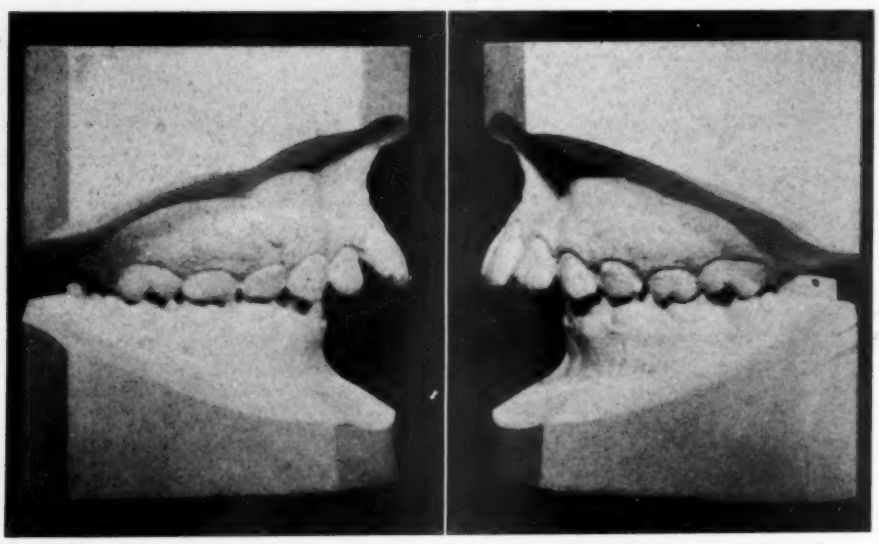

Fig. 7.—Right and left view of distoclusion (?). Molar relationship and protrusion of incisors indicate Angle Class II Division 1. Facial balance is good except for a "poutiness" of the upper lip which indicates a forward position of the upper teeth. This is substantiated by the *forward slant* of the upper first permanent molars. These molars ordinarily have a slight distal slant and the change of inclination is a valuable diagnostic sign of forward translation of the upper teeth. (See Fig. 8.)

Our profession has been slow in effort to solve our diagnostic problems. At least, we have not given the same attention to them as to mechanistic problems. Our lack of knowledge concerning them is a real handicap. It seems sensible, though we apparently have not acknowledged it, that it would be much better to know what is wrong before we set out to correct it. As evidence I submit the procedures which are uniformly followed in the treatment of distoclusion. We place maxillary labial and lingual arches with first permanent molar anchorage, similar molar anchorage in the mandible with a lingual arch, then intermaxillary elastics. Our justification for the therapy is the relationship of the molars.

Think what that means. We are supposed to be treating distoclusion—the lower part of the denture is posterior to normal. The maxillary arch posteriorly should be in relatively good anatomical position though the anterior region may be protruded or retruded. The effect desired by the use of the elastics is either to bring or to develop the lower forward, but there is a reasonable assumption that the elastic effect on the upper is equal to the elastic effect on the lower. In the accepted arrangement for elastic use, even though the lowers come forward as desired, the distribution of the elastic force will also cause the uppers to go backward. If they do, we are not correcting disoclusion as we think of it but a mixture of distoclusion of the lower and mesioclusion of the upper. Most men would lessen or totally discontinue the use of elastics when they note the mesiobuccal cusp of the maxillary first molar in the buccal groove of the mandibular.

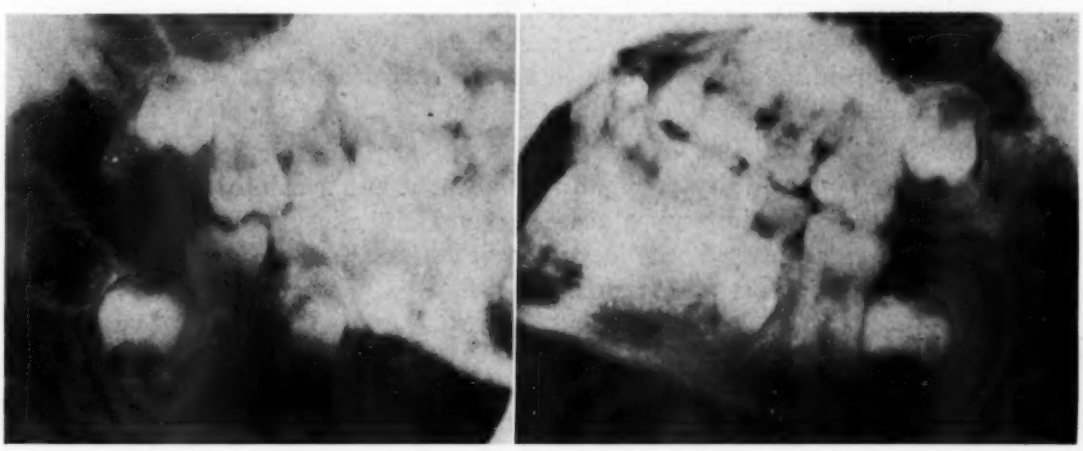

Fig. 8.—Radiographs of case shown in Fig. 7. Note forward slant of upper first permanent molars.

When this happens, how do they know which part of the denture moved the most? The lower may be forward from its former diagnosed distal position, but not as far forward as facial, anatomical, and occlusal balance may demand, and the upper from the effect of the elastics actually may have been moved into an anatomically improper distal position. In other words, neither upper nor lower are where they should be. The usual technical procedures of treatment for true distoclusion are not sound, and we have been successful in many cases simply because we did not know exactly what was wrong. Fortunately for us, so-called distoclusion often has been a slight forward positioning of the uppers and a slight distal position of the lowers, a situation suitable for haphazard intermaxillary elastic use. The effect of our intermaxillary forces in true distoclusion should be devoted entirely to bringing the lower dental arch forward, or developing the mandible, if such is at all possible. This has not been the case, but fortunately a lot of the malocclusion which appeared to be distoclusion based upon usual diagnostic procedure was not true distoclusion. Without too accurate knowledge of what we were trying to do, we were actually doing within reasonable bounds the right thing.

If I were asked to outline helpful data relative to determining whether a distoclusion existed (Fig. 7), I would make my list somewhat as follows:

Whenever a well-formed lower dental arch is seen in a supposed distoclusion, be very suspicious as to whether the malocclusion is a true distoclusion.

Make use of the x-ray to note molar region development and what is happening to the molars as to positioning. A mesial slant is an important diagnostic aid. (Fig. 8.)

Pay close attention to inherited tendencies as evidenced by facial form and jaw form of parents and others in family.

Watch for asymmetrical jaw development both in bilateral and unilateral malocclusion.

Have a full appreciation of the overbite, what it means to occlusion of the teeth and to facial balance.

With these points constantly before us, I believe we can improve our score in the handling of distoclusion or its counterpart. You probably have thought about these considerations if you have become satisfied that molar relationship as a sole basis of determination will not do.

Since so-called distoclusion is such a very great part of orthodontic practice, I welcomed the opportunity to think a bit about it and speak to you concerning it. In these small meetings much good can come to the members from a friendly presentation, regardless of whether we agree with what everyone has to say. Thank you for giving me this opportunity.

831 PARK AVENUE

Orthodontic Directory of the World

The thirteenth edition, 1946, of the Directory is now in the process of compilation. All orthodontists other than those within the limits of the continental United States and Canada who are eligible for listing should communicate with the editor. Those residing within the United States and Canada will be contacted in the near future; however, orthodontists who were not listed in the twelfth edition should write the editor for an application blank, which will be presented to the credentials committee for action.

Dr. Claude R. Wood, the present editor, announces the appointment of Dr. Oren A. Oliver, Medical Arts Building, Nashville, Tenn., as editor. All communications should be addressed to Dr. Oliver.

The Child Patient in Dental Practice*

THE heyday of children's dentistry was reached during the years of the depression in the early and middle 'thirties. It was during that period also that a group of children's dentistry crusaders traveled up and down and across the far reaches of our country holding dental audiences spellbound. True, these champions of pedodontia owed much of their popularity to their *manner* rather than to their *matter*. It was more often because of their platform histrionics rather than their scientific and technical skill that they attracted capacity audiences of dentists.

With the improvement in general economic conditions, the practice of children's dentistry entered a period of decline which reached its lowest ebb during the war years. Today, postgraduate courses in dentistry for children are unheard of and dental societies shy at inviting essayists to address them on the subject because they find it to have "no audience appeal." The lack of children's dentistry on local and state dental programs is a reflection of the low status of dental service for children as far as the individual dentist is concerned.

The trend away from children's practice was recognized early by the American Dental Association. When the Selective Service examinations revealed the grossly neglected mouths of the young men of draft age, the American Dental Association, through its Council on Dental Health, appointed a Victory Corps Dental Program Committee to urge dentists to give service at least to the young men and women about to enter the Armed Forces and war industries. The various state and local societies, New York State and the First District Dental Society among them, fully supported the effort. An appeal was made on professional and patriotic grounds, asking dentists to give priority appointments to children and youth.

Although a high percentage of dentists pledged themselves to give children priority appointments, in actual practice it was found that children were being asked to wait from one to four months or longer for an appointment. A number of dentists went so far as to send letters of protest against the campaign of the Council on Dental Health, stating that they were too busy to bother with children. "Let the children wait," said they. At the same time school authorities became aware that children were taking unduly long periods of time to have their dental defects corrected or were many times given "completion certificates" without having their teeth treated at all and in a growing number of instances the children were refused treatment altogether because the dentist was "too busy."

Today, public health authorities, educators and parents all appreciate the importance of dental care for children. The American Dental Association recognized the need for and the importance of children's dental care in its

*Editorial reprinted from *New York Journal of Dentistry* 15: No. 9, November, 1945.

"Statement of Principles on Dental Care of the American People" when it said, "All available resources should first be used to provide adequate dental treatment for children and to eliminate pain and infection for adults."

A portent of coming events in the provision of dental care for children is to be found in the plan now in force in Argentina where dental examinations of school children are made periodically. The parents are notified if the children require dental care, which can be given by the family dentist or obtained free in the national dental centers. Parents who break the law are fined 20 to 50 Argentine pesos ($5 to $12). Teachers may be penalized with a fine of 100 Argentine pesos ($25). Repeated infraction is punished with temporary closure of the school if private or with discharge of the teacher if the school is operated by the government.

The American Dental Association, in "A Dental Health Program for the United States," emphasizes dental care programs for children and calls for local effort in experiments for the provision of dental care for children under the administration and control of the dentists themselves. The Association does "not recognize a national compulsory health insurance system as effective or desirable in providing dental care."

To date, local dental groups have not taken the initiative nor have they shown much interest in the solution of the children's dental problem. And so, between the unwillingness of the individual private dentist to meet his responsibility to children, the failure of local dental groups to take the initiative and the growing demand on the part of the interested lay groups mentioned in the foregoing, it may well be that the provision of dental care for the children of the country will be taken out of the hands of the profession altogether.

While it is true that the provision of dental service programs for children is not the concern of dentists alone, for the sake of professional progress and public welfare, the solution should not be left entirely in the hands of extra-professional agencies. With the return to civilian practice of thousands of young dental officers, the time for experimentation in order to find the most economical method for providing dental care for children on a community basis is at hand.

A number of plans have been suggested. None has as yet been brought into being. Those interested in child health who today recognize the value of oral health and periodical dental care, especially during childhood, are bound to find means for providing the children with this service. Already there is talk of developing "auxiliary" workers to care for children. Neglect of the teeth of children by the private dentist will serve as an affirmation of the need for such personnel. Will dentistry assume its responsibility to the children of the nation or is the profession going to stand by and wait for others to maneuver it into a "take it or leave it" position?

J. A. S.

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Max E. Ernst, Secretary, American Association of Orthodontists, 1250 Lowry Medical Arts Bldg., St. Paul, Minn.

In Memoriam

FLOYD EDWARD GIBBIN

Floyd Edward Gibbin, of Buffalo, New York, was born Nov. 15, 1891, and passed away suddenly at his home, Dec. 12, 1945, as a result of a cerebral hemorrhage.

Dr. Gibbin, aside from his connections with various fraternal organizations, was active in many dental groups. He was a veteran of World War I and a member of the American Legion. He was a man of vigorous energy and lived with zest and enthusiasm.

He was a Fellow of the International College of Dentists, a member of the American Association of Orthodontists, and was certified by the American Board of Orthodontics. Other professional and social connections were: the American Dental Association, New York Society of Orthodontists, Eighth District Dental Society, American Society of Dentistry for Children, Buffalo Dental Association, Delta Sigma Delta Fraternity, Buffalo Torch Club, Buffalo Advertising Club, and the Springville Country Club.

The University of Buffalo School of Dentistry ultimately will receive the residue of a trust fund for instruction "in the field of preventive orthodontics," by the will of Dr. Gibbin, according to information secured from the Buffalo *Domestic News*, subsequent to Dr. Gibbin's death. Dr. Gibbin stated in his will, dated April 27, 1945, that it was his aim and purpose "that the most competent and skilled instruction possible be secured." In so far as this writer is aware, this is the first and only endowment made by the will of an orthodontist to advance orthodontic education.

Dr. Gibbin's keen interest in the future of his profession was shown in the following statement: "It is my purpose, wish and hope that from this fund may grow a keener appreciation, among the teaching and practicing members of the orthodontic profession, and the general practitioner of dentistry, of their opportunities and obligations to render increasingly more effective assistance to and treatment of children yet unborn."

Dr. Gibbin devoted a great deal of thought and time to the subject of efficiency in office management. He was in demand as an essayist on this subject before dental groups throughout America. He wrote and published numerous manuscripts. In his own office routine he practiced and tried out various plans of office efficiency as related to orthodontic practice.

Dr. Gibbin was an enthusiast pertaining to the specialty of orthodontics and never tired in his efforts to improve himself and his work. It was his contention that orthodontists were serving too few of the population and that the time had come for this situation to be improved. His efficiency policy was based on this

supposition and, in fact, at the time of his sudden death, he left on his desk a manuscript, "Looking Ahead," that he expected to read before the Southern Society of Orthodontists in February, 1946.

Dr. Gibbin is survived by his wife, Elizabeth Bruso Gibbin, and a brother, Leslie A. Gibbin of Springville, New York.

Dr. Gibbin's life so well exemplifies the line of D. G. Metchill: "There is no genius in life like the genius of energy and activity." He lived life energetically and forcefully and enjoyed it to the last. He died at the end of a busy day, and that, no doubt, is as he would have liked to pass away.

H. C. P.

Department of Orthodontic Abstracts and Reviews

Edited by

Dr. J. A. Salzmann, New York City

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Obturator (Acrylic) for the Newborn Infant With Cleft Palate: By Captain I. E. Schapiro, Medical Corps, Captain Arthur Walden, and First Lieutenant Gordon A. Carman, Dental Corps, *J. Pediat.* **27**: 288-290, September, 1945.

The newborn infant with a cleft palate and often with an associated cleft lip presents a medical problem as well as a surgical problem. Feeding the infant with a cleft palate by medicine dropper or Breck Feeder is time consuming and not without risk of aspiration.

To facilitate the problem of feeding the infant with a cleft palate we first tried the obturator shown in Fig. 1. This has a flexible, flabby rubber flange, which did not close the defect in the palate. Milk returned through the nose and it was very difficult for the baby to take his bottle.

Fig. 1.

Our first case was that of an infant with a double cleft in the palate and a cleft lip (left), one of twins. The other twin had no visible congenital defects. On the seventh day a model was taken of the baby's palate and maxilla, using modeling compound. This modeling compound softens at relatively low temperature and lends itself well to working in the infant's mouth. A satisfac-

tory model was thus obtained and from this model, Cast No. 1 was made. The acrylic plate, modeled from Cast No. 1, shown in Fig. 2, was inserted before feedings and removed at the end of each feeding. The nurses who fed the infant reported no difficulty in inserting or removing the obturator. The infant after the second day did not resist the use of the obturator and took his feedings well.

Fig. 2.

On the fourteenth day the cleft lip shown in Fig. 3 was operated on by Major Joseph Kostrubala, Medical Corps. During the ten-day period following this operation, the obturator was not used so as not to interfere with the healing of the lip. On the twenty-fourth day another model was made of the baby's mouth (Cast No. 2). Note how much closure in the cleft maxilla took place within ten days following the lip closure. Marked closure was also noted in the cleft palate. At time of writing, the infant was wearing the obturator modeled from Cast No. 2. The formula as well as the cereal feedings were taken without difficulty.

Two months following our first case, a second case of a child born with a cleft palate and a double cleft lip came under our care. This infant (Fig. 4) had a very large defect in the palate. Through this defect the septum and turbinates could be clearly seen. In spite of the large defect in the palate, the acrylic plate fit well and the mother had no difficulty in giving the bottle.

Fig. 3.

Fig. 4.

Following repair and healing of the lip a second model and plate were made. The obturator was introduced and removed without difficulty and the waste of time required for dropper feeding and the dangers of dropper feeding were entirely eliminated.

In November, 1938, Sillman reported on the use of an obturator made of vulcanite. The acrylic type obturator has some advantages over the vulcanite

type. It is lighter in weight, transparent, and easier to keep clean, it is entirely tasteless and odorless, absorbs very little or no moisture, thus avoiding any sogginess, extraneous odors, or tastes. It is not irritating to the tissues. Bacteria find a better media for growth on the vulcanite than on the acrylic type obturator. Acrylic is easier to repair and remains transparent after repair.

A Macrodontic Bushman Skull in Relationship to a Boskopoid Skull With a Similar Dentition and Large Jaws: By Professor M. R. Drennan, M.A., M.B., Ch.B., F.R.C.S.(Edin.), *South African D. J.* **19**: 343-347, August, 1945.

The teeth of a typical Bushman are essentially small in size. I found a considerable range of variation which seemed to be rather extraordinary, because the upper limit of variation of each tooth of this microdontic group of individuals greatly exceeded the average size of the mesodontic Bantu dentition and approximated the dimensions of the relatively huge macrodontic dentition of the Australian aboriginal.

Variation is one of the fundamental features in nature, but variation has not yet been adequately explained. We can trace the cause of some of it backwards and attribute it to that fascinating shuffle of the genes for different characters which takes place in hybridization. This is because, in virtue of the process of bisexual propagation, we are all hybrids, the end product of familial and racial combinations reaching back to human beginnings. But the greatest difficulty is with the forward process, because the science of genetics has proved that there are strict limits set to the variations of hybridization which are predetermined by the genes. We get nothing really new or progressive out of existing genes. It is now known, however, that new genes may appear suddenly and give rise to mutations or sports, but their origin, although they are undoubtedly reversionary to some extent, is still a mystery. The fact that x-rays can give rise to permanent hereditary mutations in rats does seem suggestive, however, that the genes may not be so immutable as we have regarded them, and that climatic, food, and other environmental factors may create an internal chemical tension which permanently affects the genes.

In the present instance the variation is a dental one and it occurs in a Bushman skull. The unusual feature which this skull shows is a relatively huge dentition in an otherwise completely typical Bushman skull. This skull came from a cave at Kalk Bay, where it was excavated at a depth of about 4 feet and just under a somewhat sterile deposit of the "kitchen midden" or Strandloper culture, the excavation being carried out by the recently formed Cape Archaeological Society.

The second skull was in a very friable condition and it had been considerably distorted by a root which was growing through it when found. From an excellent photograph and from its present restored condition one can see that it is a Boskopoid type of skull, that is to say, considerably bigger and more robust than a Bushman skull. The jaws, which fortunately are in almost perfect condition, are indeed the most massive of all the Boskopoid types of jaw hitherto discovered. The mandible is, in fact, next in size to that of the Springbok Flats individual, which is the largest fossil jaw we have in South Africa to date. The teeth, moreover, are also on the big side, and are practically identical in size with the specially big teeth of the Bushman skull found in the adjoining cave.

With regard to the actual measurements, I need only say that the linear diameters show that the incisors, canines, and premolars of these two skulls show the same degree of robustness that Middleton Shaw found in the corresponding teeth of the Bantu. It would appear also from measurements which I have made in a small group of Hottentot skulls that these teeth conform to

the Hottentot type of dentition, which seems to exceed the size of that of the Bushman in the same way as the skull of the Hottentot is usually larger than that of the Bushman.

The molars of these two skulls are, however, definitely larger than the average Bantu molars and they exceed in size the average of the still bigger Hottentot molars. The mesiodistal diameters, especially of the first and second molars, are actually as big as the corresponding diameters of the big-toothed Australian aboriginal, although they are not quite so wide in a labiolingual direction. A special feature of the molars of these dentitions is the primitive and simian way in which the second molars so definitely exceed the size of the first molars. An important point which has a bearing on the discussion of these dentitions at a later stage is the fact that the teeth of all these mandibles figured show under the x-rays a well-marked and approximately equal degree of "taurodontism." This is a vertical enlargement of the pulp cavities, which is generally regarded as a primitive character, and its existence in all three specimens is proof of their racial affinities. An interesting feature of these teeth from the point of view of dentistry is the manner in which these big teeth have been housed in the small Bushman jaws without any special sign of overcrowding within the arcade, although there is very decided degree of "dental" prognathism in this skull.

A discussion of these two dentitions raises some interesting questions regarding dental evolution and inheritance. Although most dentists must have noticed interesting familial features in the dentitions of succeeding generations, very little attention has been paid to these from the genetic point of view. I think I am right in saying that we have been too apt to regard teeth as being for all practical purposes alike, and this has been carried to the extent of manufacturing them to a standard pattern. Our ideas about dental variation seem to me to have been dominated also by pathology, that is to say, we have assigned most of the changes to dietetic influences and to the effects of use and disuse. This conception has invaded evolutionary thought to such an extent that hitherto almost all changes in the dental picture of evolution have been attributed to what we have been pleased to call adaption to particular diets.

I think it will be conceded that the big teeth in the Bushman skull are best interpreted, not as any forward-directed mutation of adaptation, but as a reversion to some big-toothed ancestor or as a variation, the result of hybridization. In ordinary circumstances one would be entitled to regard the condition as reversionary, because, knowing as we now do that the human dentition has been evolved from a big-toothed anthropoid dentition, we must concede that the Bushman had at one time a big-toothed ancestor to whose characteristics he could on occasion revert. Archaeological excavations in our coastal caves have, moreover, shown that the small-skulled Bushman is only found in the higher levels, whereas it is the big-headed and big-toothed Boskop types that appear as we dig deeper down. The original Boskop skull from the Transvaal, the Kalomo one from Rhodesia, and other old Boskopoid remains all suggest that the Boskop type antedated the Bushman. It is quite conceivable, therefore, that it was from this old branch of the human tree that, by a process of glandular adjustment to desert conditions, the Bushman assumed his pygmy form and the Bushwoman her characteristic method of storing fat for the emergency of rearing children through a drought. Where this evolution took place, however, we do not know, but we must suppose that the refinement of his teeth arose as a concomitant of the general dwarfing of his skeleton. An interesting point which the present case brings out is that the genetic background of dwarfism is not "totalitarian," because, although the Bushman under discussion must have been an undoubted pygmy, a notable exception has been made with regard to his teeth.

News and Notes

University of Kansas City School of Dentistry

The University of Kansas City School of Dentistry has announced its new Graduate and Postgraduate Study for 1946-1947.

On Feb. 4, 1946, The University of Kansas City School of Dentistry is inaugurating its Graduate Division. The initiation of this program is in keeping with the progressive trends in dental education and in response to requests for advance study. A second class will open Feb. 3, 1947. At intervals special short courses will be announced.

At present two types of work are available: (1) Postgraduate, in which the dentist concentrates his efforts in one field for at least one school year in orthodontics and satisfactorily completes prescribed courses and clinic. When the work is completed a certificate is awarded. (2) Graduate, in which the dentist meets the requirements for the degree Master of Science in Dentistry.

The instructors in the orthodontic department are as follows:

W. Wayne White, D.D.S., Director and Clinical Professor of Orthodontics.

George Nagamoto, B.S., D.D.S., M.D.Sc., Associate Director and Instructor in Orthodontics.

Francis M. Calmes, B.S., D.D.S., M.D.Sc., Associate Professor of Operative Dentistry.

John W. Richmond, D.D.S., Clinical Instructor in Orthodontics.

Donald A. Closson, D.D.S., Clinical Instructor in Orthodontics.

Courses are given in Principles of Orthodontics, Orthodontic Diagnosis, and Orthodontic Clinic.

Fifth Medico-Dental Convention of Mexico

The Organizing Committee of the Fifth Medico-Dental Convention of Mexico, in recognition of his contribution to the success of the first Inter-American Orthodontic Congress, held in New Orleans, Louisiana, U. S. A., has appointed Colonel Claude R. Wood of Scott Field, Belleville, Illinois, as honorary president of the Fifth Medico-Dental Convention to be held in Mexico City, Feb. 18 to 23, 1946.

Columbia University Course in Orthodontics

The School of Dental and Oral Surgery, of the Faculty of Medicine of Columbia University, announces a change in date for Dentistry CE 324—Orthodontics—Dr. John V. Mershon and staff, March 4 to 9, 1946, inclusive, to April 1 to 6, 1946, inclusive. This course will consist of lectures, conferences, technical training in the lingual-labial arch appliances, and the basic principles of treatment associated with this appliance for the correction of malocclusion.

For further information, address the Assistant to the Registrar, School of Dental and Oral Surgery, 630 West 168th Street, New York 32, New York.

American Dental Association

Expert guidance for thousands of dentists who served in the Armed Forces during World War II to help them establish or re-establish themselves in civilian practice is given in a special January issue of the *Journal of the American Dental Association.*

Devoted exclusively to the needs and problems of returning dental officers, this edition of the *Journal* endeavors to aid returning dentists to choose their branch of dentistry and to locate themselves in areas where their services will be most useful and profitable.

The following summarizes several of the problems considered:

Location.—Veteran dental officers are urged by two leading American Dental Association authorities to settle in smaller communities to meet the critical needs of rural areas.

Dr. Walter H. Scherer of Houston, Texas, president of the American Dental Association, and Joseph Bagdonas of Chicago, secretary of the A.D.A. Committee on Economics, advise returning dentists to study carefully the distribution of dentists throughout the country and to establish private practice in areas which need dental service.

In his "President's Message" to the returning dental officer, Dr. Scherer points out that a "number of smaller communities in the United States, many of which had dental service prior to the war, are now without service. To meet critical needs, it is essential that these communities be provided with dentists soon. It is hoped that the returning dental officers will look into the possibilities of the smaller communities . . ."

Joseph Bagdonas, in a detailed article on "Economic Considerations in Reestablishing a Dental Practice," declares that "the dentist starting practice in a smaller community will find it easier to gain recognition and to establish himself because he becomes a part of the total community. In the large city, he is merely a new name to most people, often living in a different part of the city from that where he practices."

Bagdonas' report includes population charts which show the average number of persons per dentist in rural and urban communities; graphs showing distribution of dentists; tables showing national income and expenditures for dental care, and charts indicating the average net income of dentists in the United States according to age and the size of the community.

The article reveals that dentists in cities of 500,000 population and over had a lower average net income than dentists practicing in communities of from 50,000 to 100,000.

Education and Training.—Recent studies of the postwar plans of dental officers indicate that next to going into private practice, most dentists intend to acquire additional training in dentistry. The January *Journal* reports concisely on the dental veterans' plans for the future by means of a specially prepared pictograph and accompanying table.

Dr. Harlan H. Horner of Chicago, secretary of the A. D. A. Council on Dental Education, declares in an article entitled "Educational Opportunities for the Returning Veteran" that the veteran who left his dental studies to enter the service, or who was prepared to enter dental school and was obliged to change his plans, should adhere to his original purpose of becoming a dentist.

". . . Recent studies indicate that the dental profession is not overcrowded," Dr. Horner points out, "and there is no prospect of its being overcrowded in our time."

All signs, he further reports, indicate an increased public demand for dental service and a decreased supply of dentists in proportion to the entire population.

"It seems clear, therefore, that young men and women returning from the service of their country . . . with a genuine bent toward scientific endeavor and with a desire to serve humanity in a career which promises reasonable material rewards and great professional satisfaction, need not hesitate to study dentistry."

Dr. Horner also states that refresher, postgraduate, and graduate courses are now being offered in the dental schools especially to meet the needs of returning members of the Armed Forces.

In conclusion, the author lists the dental schools which have the approval of the A. D. A. Council on Dental Education.

In a second article, "Opportunities for Dental Officers in Education and Research," Dr. Horner writes that "dental schools throughout the country are now looking for clinical teachers with a college degree, with a dental degree and with an advanced degree or with equivalent evidence of intellectual curiosity and capacity."

Many schools, he declares, are looking for graduate dentists who have pursued advanced studies in one or more of the fundamental sciences. "Teachers with this background, many schools believe, will help solve the always difficult problem of bridging the gap between science instruction and clinical work. More and more, schools are looking for additions to their faculties of teachers who can be given limited schedule of class, laboratory and clinical work and be freed for a part of their time to engage in practical research projects."

Legislation.—The GI Bill of Rights is interpreted for the veteran dental officer by George Fox of Chicago, secretary of the Committee on Legislation of the American Dental Association.

Among the benefits the veteran dentists receive under the present GI Bill is the readjustment allowance benefits which, Fox reports, are in the nature of an unemployment program.

The purposes of the readjustment allowance program are to guarantee to the unemployed veteran a definite income per week and to guarantee to the self-employed veteran a net cash income of not less than $100 per month.

"Assume," the author writes, "that the dentist veteran opens a dental office and in the first month renders dental service in the amount of $400, that he received $200 in cash and extends credit for the other $200, and that his rent, salary for an assistant, supplies used that month and other office expenses total $185, he is entitled to a readjustment allowance of $85 which is the difference between his net cash income and $100."

Dental Materials.—The returning dentist must exercise caution in the use of new drugs, chemical mixtures, and mechanical devices, the Council on Dental Therapeutics of the American Dental Association warns in a report entitled "Changes in Drugs, Chemicals and Devices During the War Period."

The Council urges the judicious and limited use of sulfonamides and penicillin. "Because of the seriousness of their possible toxic effects and danger of sensitizing patients," the article points out, "the internal use of sulfonamides in dentistry should be limited to the treatment of deep-seated infections caused by the presence of sulfonamide-sensitive organisms . . . Since there is a potential danger of sensitization from the topical (local) application of sulfonamides, such uses in dentistry should be limited to those cases in which accessible infections are present or may be anticipated."

The article states that further studies are needed on penicillin to determine adequately its contribution to recovery from dental infection.

Further Criteria Reductions for MC, DC, and VC

Further criteria reductions to make additional doctors, dentists, and veterinarians available for civilian practice were announced today by Major General Norman T. Kirk, The Surgeon General of the Army.

While the number of professional men affected by this action will not be more than a thousand, The Surgeon General's Office has ordered this revision of criteria in line with the Medical Department's policy of doing everything possible to expedite the return of doctors, dentists, and veterinarians to private life.

Under the new separation plan which becomes effective Jan. 1, 1946 (with the exception of a comparatively small number in scarce categories), dentists, and veterinarians will be released with a critical score of 65 instead of the 70 points previously required. This same group will also be able to get out of the service if the age of 45 has been reached instead of the former age limit of 48.

The time factor of 42 months' service, which will make any of this group eligible for separation, remains the same.

The following specialists in scarce categories will be released with a critical score of 80, continuous service since Pearl Harbor, or if the age of 45 has been reached: eye, ear, nose specialists; orthopedic surgeons; and internal medicine specialists.

A requirement of 70 points, 45 months service, or 45 years age limit will make the following eligible for separation: gastroenterologists, cardiologists, urologists, dermatologists, anesthetists, psychiatrists, general surgeons, physical therapy officers, radiologists, and pathologists.

Nutrition Surveys Conducted in Germany

Charged with safeguarding the health of American soldiers and advising and cooperating with the Military Government in Germany, the Army Medical Department has furnished plans and directions, as well as personnel, for carrying out nutritional studies which far surpass in scope and magnitude anything of the kind ever attempted before, Major General Norman T. Kirk, Surgeon General of the Army, announced.

At the present time, about 20,000 civilians in the U. S. Zone of Germany are being given physical examinations each month, and approximately 100,000 more are weighed monthly as a means of determining the health curve of the population in the American occupied areas.

Colonel J. B. Youmans, M.C., Director of the Civil Public Health and Nutrition Division of the Army Medical Department, visited Germany in August, September, and October to aid in setting up the machinery for this vast nutritional survey work which gives the authorities an indication of the health of German civilians. Major William F. Ashe, Jr., M.C., of The Surgeon General's Office, is now serving as Chief Nutritional Consultant for the Office of Military Government of the United States in the German occupied territory.

This unprecedented survey work is being carried on in Germany under five nutrition survey units and one in Austria, each headed by an expert nutrition officer with a staff of trained doctors and technicians qualified to establish the nutritional status of individuals. Each group is equipped with compact and mobile laboratory apparatus designed for making tests of blood hemoglobin, serum protein, plasma, vitamin C, thiamin, riboflavin, and other nutritional factors.

Examinations are conducted in every city of the United States Zone with the cooperation of civilian public health and food rationing authorities. In every city of over 10,000 population, weighing examinations are made of 5 per cent of the population. This percentage is graduated down to a point of 0.5 per cent of the population of a city of 1,000,000. These weighing examinations, which can be given rapidly, provide a rough indication of the nutritional status of various communities.

The nutritional physical examinations are done on a sampling basis to afford an accurate picture of the nutritional condition of different groups. Doctors from these nutrition groups direct a certain number of persons to be examined of various ages and occupations, both men and women. The ration cards of the prescribed number are obtained through the police, and the individuals are notified.

In each case the individual is questioned regarding the diet he or she has been following and the amount of food consumed. From the clinical examinations and laboratory studies an estimate of the effect of such a diet can be made. An analysis of all the examinations given in a community form the basis for recommendations on the adequacy or inadequacy of food in that area.

Food and agricultural authorities take these studies into account in determining the amount of food supplies needed, the movement of food, and estimates for food production.

Thomas P. Hinman Mid-winter Clinic

The Thomas P. Hinman Mid-winter Clinic, under the auspices of The Fifth District Dental Society, will hold its thirty-third annual meeting on March 24, 25, 26, and 27, 1946, at the Atlanta City Auditorium in Atlanta, Georgia.

The American Society for the Advancement of General Anesthesia in Dentistry

The Spring Meeting of the American Society for the Advancement of General Anesthesia in Dentistry will be held at the Hotel New Yorker, 34th Street and 8th Avenue, New York City, on Monday evening, March 25, 1946, at 8:15; with a premeeting dinner at the Hotel at 7 o'clock.

The scientific program will be devoted to a discussion of the physiology of respiration with special relationship to anesthesia.

The profession is cordially welcome.

American Association of Orthodontists

The next meeting of the American Association of Orthodontists will be held at the Broadmoor Hotel, Colorado Springs, Colorado, Sept. 30, Oct. 1, 2 and 3, 1946. Members of the American Dental Association are invited to attend this meeting. Proper credentials should be obtained in advance from the secretary of the American Association of Orthodontists or from the secretary of a constituent society.—MAX E. ERNST, Secretary, 1250 Lowry Medical Arts Bldg., St. Paul 2, Minn.

Notes of Interest

Dr. Harold J. Noyes, orthodontist of Chicago, Illinois, has been appointed Dean of Oregon University School of Dentistry and will take up his duties in that institution July 1, 1946. Dr. Noyes was formerly connected with the orthodontic department of Northwestern University School of Dentistry.

Dr. Irwin Steuer, formerly of Cleveland, Ohio, announces the opening of offices for the practice of orthodontics at 415 North Camden Drive, Beverly Hills, California.

Dr. H. Allen Bimston announces that he is limiting his practice to orthodontics, at The Medical Arts Building, 1882 Grand Concourse, New York 57, New York. Tremont 2-4147.

OFFICERS OF ORTHODONTIC SOCIETIES*

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*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

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Asociación Méxicana de Ortodoncia

President, Guillermo Gamboa - Madero 34-3
Secretary, Rutilio Blanco - Donceles 98-209
Treasurer, Carlos M. Paz - Av. Insurgentes 72

*The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis 5, Mo., U. S. A.